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NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA  
SOLAR H-ALPHA FLARE ATLAS BASED ON NOSC VIDEOMETER DATA.(U)  
JAN 78 P E ARGO, W LOOMIS  
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Technical Document 140

## SOLAR H-ALPHA FLARE ATLAS BASED ON NOSC VIDEOMETER DATA

PE Argo  
W Loomis

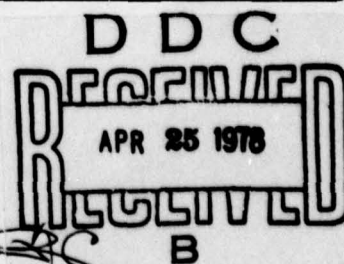
5 January 1978

Prepared for  
Air Force Geophysics Laboratory  
Bedford, MA 01730

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### ADMINISTRATIVE INFORMATION

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Released by  
Dr JH Richter, Head  
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Under authority of  
JD Hightower, Head  
Environmental Sciences Department

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## CONTENTS

INTRODUCTION...	page 3
VIDEOMETER SYSTEM DESCRIPTION...	3
ACTIVE REGION MEASUREMENTS...	3
DATA DESCRIPTION...	13
TIME PROFILES...	13
SUMMARY...	26
APPENDIX: SOLAR FLARE DATA IN CHRONOLOGICAL ORDER...	27

## ILLUSTRATIONS

1. Solar flare data acquisition system... page 10
2. Solar flare digital videometer system... 11
3. Videometer scan of TV output... 12
- 4a-b. Brightness distributions... 14
5. 2-B flare, 24 January 1971... 15
- 6a. Hawaii, 31 October 1972; R460, -F flare, bin 31... 16
- 6b. La Posta, 2 May 1973; R092, -N flare, bin 20... 16
- 6c. La Posta, 11 April 1973; R077, -B flare, bin 25... 17
- 6d. La Posta, 7 April 1973; R078, 1N flare, bin 22... 17
- 6e. La Posta, 11 April 1973; R077, 1B flare, bin 24... 18
- 7a. Hawaii, 24 October 1972; R448, -F flare, bin 26... 20
- 7b. La Posta, system A, 10 May 1972; R176, -N flare, bin 34... 20
- 7c. La Posta, system B, 10 May 1972; R176, -N flare, bin 36... 21
- 7d. La Posta, system B, 17 May 1972; R195, 2B flare, bin 30... 21
- 8a. La Posta, 31 October 1972; R460, -F flare, bin 32... 22
- 8b. Hawaii, 31 October 1972; R460, -F flare, bin 31... 22
- 9a. La Posta, 10 September 1973; R219, U -F flare, bin 25... 23
- 9b. Hawaii, 10 September 1973; R219, U -F flare, bin 29... 23
- 10a. La Posta, 25 October 1972; R460, -B flare, bin 25... 24
- 10b. La Posta, 25 October 1972; R460, -N flare, bin 25... 24
- 10c. La Posta, 25 October 1972; R460, 1N flare, bin 25... 25
- 10d. La Posta, 25 October 1972; R460, 1B -N-N flares, bin 27... 25

## TABLE

1. H-alpha flare catalogue... page 4

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## INTRODUCTION

Solar  $H_{\alpha}$  flare measurements are commonly used as the reference point for solar geophysical studies, even though a review of the collected  $H_{\alpha}$  data reveals wide discrepancies between observations.<sup>1</sup> Therefore, the Naval Ocean Systems Center has developed a digital solar flare measuring system that employs semiautomated computer-video techniques for use in flare patrol networks. The "videometer" has made possible the study of fine temporal structure during optical flares and offers direct comparison with both radio and x-ray data.<sup>2</sup> Periodically from early 1971, two systems were run simultaneously; the series included a separation test in which one system was moved to Hawaii (from San Diego). During these operations, 150 flare observations were catalogued, with 23 being seen by both systems. Most of the events observed have been small (subflares), although a 3B flare observed on 24 January 1971 will also be shown.

This document is a compendium of the flare data collected between January 1971 and June 1974. A summary of the peak area, brightness, and times is given in table 1; more complete time history profiles on an event-by-event basis are displayed in the ensuing pages. These profiles are the major reason for this report.

## VIDEOMETER SYSTEM DESCRIPTION

The videometer system has been described in detail elsewhere,<sup>3,4</sup> so it will be discussed only briefly here. The system consists of a 5-inch telescope, a high-resolution (945-line) TV system, and associated electronics, an 8K digital minicomputer, and the necessary readout devices. The overall system concept is diagrammed in fig 1; an artist's conception of the system is shown in fig 2. The tracking telescope, 0.8Å  $H_{\alpha}$  hybrid filter, and closed-circuit television system form one unit (which is positioned at an appropriate viewing location). A computer, interface, stripchart recorder, and video monitor form the second unit, which, along with the input/output teletype, is housed in a building near the telescope site.

## ACTIVE REGION MEASUREMENTS

The videometer digitizes the brightness levels of picture elements in an array taken within a rectangular region, usually enclosing an active region (see fig 3). Each element in the array covers approximately one millionth of the solar disc. The brightness levels can range from 1 to 64, with 1 being a very dark sunspot and 64 set higher than the highest expected flare brightness. The elements at each brightness level (1-64) are summed so that the stored data are in an "area" (number of points)-versus-brightness-level format.

<sup>1</sup> Air Force Cambridge Research Laboratory TR 73-0181, The Construction and Testing of a Pair of Matched Solar Telescopes, 14 March 1973

<sup>2</sup> NELC TR 1890, Solar Videometer: An Automatic Solar Flare Identification and Classification System, by PE Argo et al, 23 August 1973

<sup>3</sup> Ward, FR, et al, Solar Flare Observations from a Pair of Matched Instruments, Solar Physics, 31, p 131-141, 1973.

<sup>4</sup> Argo, PE, et al, Analysis of Digital  $H_{\alpha}$  Solar Flare Measurements, International Symposium Solar-Terrestrial Physics, Sao Paulo, Brazil, June 1974.





Table 1. (Continued)

DAY	MON	YEAR	REGION	START	PEAK	END	SYSTEM	S.G.B. CLASS.	DATA SPECIFICATIONS	UPPER AREA	LOWER AREA
11	MAY	72	R180	2251	2301	2300A	A	-F	3	67	167
11	MAY	72	R180	2245	2303	2308A	B	-F	4	108	323
11	MAY	72	R180	1209	1510	1517	A	-F	3	14	52
12	MAY	72	R180	1929	1931	1933	A	-B	4	81	100
12	MAY	72	R180	1934	2004	2012	B	-F	6	128	247
12	MAY	72	R180	1954	2004	2018	B	-F	4	206	247
12	MAY	72	R180	2104	2110	2118	B	-F	7	283	418
12	MAY	72	R180	2135	2137	2148	B	U	5	89	101
12	MAY	72	R180	2142	2150	2158	B	U	3	95	138
13	MAY	72	R186	1751	1752	1805	B	-N	9	250	327
13	MAY	72	R186	1750	1752	1805	B	-N	2	25	53
13	MAY	72	R184	1920	1928	1945	B	-F	4	40	82
13	MAY	72	R184	1920	1928	1945	B	-F	2	33	62
13	MAY	72	R184	2247	2249	2310	B	-F	3	41	85
13	MAY	72	R184	2247	2249	2310	B	-F	3	40	101
13	MAY	72	R180	2306	2317	2327A	A	U	4	97	177
14	MAY	72	R180	1728	1734	1744	B	U	3	63	170
14	MAY	72	R184	1731	1735	1743	B	U	3	52	86
14	MAY	72	R184	1730	1738	1918	B	U	3	41	51
14	MAY	72	R180	1822	1850	1918	B	-F	3	69	83
14	MAY	72	R186	1822	1850	1918	B	-F	3	55	75
17	MAY	72	R186	2105	2109	2133	B	-F	9	116	1370
17	MAY	72	R186	2230	2243	2024A	B	-F	16	933	1370
17	MAY	72	R186	2230	2243	2024A	B	-F	3	45	69
17	MAY	72	R193	2220	2351	1838	B	-F	3	36	50
18	MAY	72	R195	1953	1955	2010	A	-F	3	209	263
18	MAY	72	R186	1953	1955	2010	A	-N	3	215	258
18	MAY	72	R195	2023	2027	2105	B	-F	9	304	332
18	MAY	72	R195	2023	2027	2105	B	-F	3	304	332



Table 1. (Continued)

DAY	MON	YEAR	REGION	STAKT	PEAK	END	SYSTEM	S.G.B. CLASS.	DATA SPECIFICATIONS	UPPER AREA	LOWER AREA
18	MAY	72	R166	2034	2132	220A	A	-F	5	171	247
18	MAY	72	R166	2038	2130	220A	B	-F	6	220	278
18	OCT	72	R448	1821	1840	1952A	HW	-N	2	38	103
20	OCT	72	R448	2041	2057	2155A	HW	-N	4	85	185
21	OCT	72	R448	2042	2008	2133	HW	-F	7	368	526
24	OCT	72	R453	2111	2122	2133	HW	-F	5	85	57
24	OCT	72	R448	2321	0056	0205A	HW	-F	1	290	362
25	OCT	72	R460	1924	1928	1930	LP	-P	9	111	140
25	OCT	72	R460	1957	2000	2005	LP	-N	5	130	161
25	OCT	72	R460	2147	2205	2214A	LP	-N	3	240	371
25	OCT	72	R460	2326	2323	2332	LP	1B	6	165	195
25	OCT	72	R460	2342	2343	2352	LP	-N	8	11	30
26	OCT	72	R460	0008	0014	0028A	LP	-N	2	31	34
31	OCT	72	R460	1939	2005	2008A	LP	-F	3	51	108
31	OCT	72	R460	2000	2005	2020	HW	-F	2	230	68
31	NOV	72	R460	2107	2112	2124	HW	-N	2	30	90
1	NOV	72	R479	2107	2112	2124	HW	-N	2	14	47
2	NOV	72	R479	2107	2112	2124	LP	-N	2	99	99
2	NOV	72	R479	2107	2112	2124	LP	-N	2	81	130
3	MAR	73	R044	2018	2020	2033	LP	-P	4	40	40
3	MAR	73	R044	2018	2020	2033	LP	-F	2	185	366
3	APR	73	R064	2027	2044	2104	LP	1N	2	117	121
3	APR	73	R064	2105	2105	2116	LP	1N	2	17	152
3	APR	73	R064	2201	2205	2212	LP	-N	2	29	178
4	APR	73	R067	1821	1823	1828	LP	-P	5	16	16
5	APR	73	R071	2023	2032	2051	LP	-N	1	36	36
6	APR	73	R071	1721	1732	1917	LP	-F	2	54	179
7	APR	73	R078	1723	1732	1738A	LP	-F	3	147	258
7	APR	73	R078	1723	1743	1804	LP	-N	4	168	219





Table 1. (Continued)

H ALPHA FLARE CATALOGUE										DATA SPECIFICATIONS		
TIME OF OCCURRENCE ( UNIVERSAL )										CHANGE IN PEAK BRIGHT.	UPPER AREA	LOWER AREA
DAY	MUN	YEAR	REGION	START	PEAK	END	SYSTEM	S.G.B. CLASS.				
30	AUG	73	R209	1931	1939	2010	LP	-N	8	172	229	
31	AUG	73	R209	1613	1616	1624	LP	-F	4	171	101	
31	AUG	73	R208	1730	1730	1744	LP	-F	2	169	172	
31	AUG	73	R203	1841	1847	1850	LP	-F	3	130	60	
4	SEP	73	R209	2143	2150	2203A	LP	-F	9	353	506	
4	SEP	73	R212	1551	1549	1617	LP	-N	7	203	49	
4	SEP	73	R219	1627	1634	1650	LP	-F	2	103	213	
4	SEP	73	R219	1706	1712	1753	LP	-F	6	124	180	
6	SEP	73	R219	1817	1907	1934	LP	-F	5	56	185	
7	SEP	73	R219	1719	1724	1734	LP	-F	3	57	188	
7	SEP	73	R219	2101	2110	2113	LP	-F	2	22	76	
10	SEP	73	R219	1807	1811	1824	HW	-F	3	42	113	
10	SEP	73	R219	1840	1846	1858	LP	-F	1	18	164	
10	SEP	73	R219	1843	1847	1858	HW	-F	3	35	175	
10	SEP	73	R219	1959	2021	2047	LP	-F	3	86	266	
10	SEP	73	R219	2011	2026	2032	LP	-F	3	86	86	
11	SEP	73	R219	2023	2026	2042	LP	-F	3	136	136	
11	SEP	73	R219	1621	1654	1701	LP	-F	2	32	60	
11	SEP	73	R219	2111	2112	2103	LP	-F	3	30	30	
11	SEP	73	R219	2111	2114	2116	LP	-F	3	52	60	
11	SEP	73	R219	1915	1920	2120	LP	-F	2	78	108	
12	SEP	73	R219	1925	1957	2000	LP	-F	2	79	138	
12	SEP	73	R219	1710	1722	1744	LP	-F	2	28	89	
12	SEP	73	R219	1855	1905	1913	LP	-F	2	16	67	
22	OCT	73	R245	1912	1917	1933	LP	-F	2	16	75	
23	OCT	73	R262	2029	2034	2034	LP	-N	1	68	95	
23	OCT	73	R262	1712	1731	1831	LP	-N	4	68	80	

Table 1. (Continued)

H ALPHA FLARE CATALOGUE											
TIME OF OCCURRENCE ( UNIVERSAL )					DATA SPECIFICATIONS						
DAY	MON	YEAR	REGION	START	PEAK	END	SYSTEM	S.G.B. CLASS.	CHANGE IN PEAK BRIGHT.	UPPER AREA	LOWER AREA
25	OCT	73	R262	2035	2039	2040	LP	-F	3	47	73
25	OCT	73	R264	2044	2048	2100	LP	-U	3	45	89
25	OCT	73	R264	2125	2129	2131	LP	-N	3	19	53
25	OCT	73	R267	1825	1837	2144	LP	-F	2	11	55
29	OCT	73	R267	1944	1837	1944	LP	-F	1	13	59
31	OCT	73	R267	1930	1946	1951	LP	-U	1	18	34
27	NOV	73	R267	1930	1956	2112	LP	-U	3	70	193
27	NOV	73	R267	2053	1943	1952	LP	-U	3	41	196
27	NOV	73	R267	1828	2055	2100	LP	-U	2	24	62
27	DEC	73	R267	1901	1830	1835	LP	-F	2	58	79
18	DEC	73	R300	1700	1903	1908	LP	-U	3	23	56
1	JUN	74	R416	1542	1703	1713	LP	-F	3	38	38
3	JUN	74	R414	1950	1546	1551	LP	-N	5	118	189
3	JUN	74	R414	2058	1955	2032	LP	-N	5	202	329
3	JUN	74	R414	2211	2102	2105	LP	-F	2	18	40
3	JUN	74	R414	2343	2349	2359A	LP	-N	3	102	102
3	JUN	74	R416	1023	2349	2359A	LP	-B	3	93	93
4	JUN	74	R416	1420	1625	1636	LP	-U	3	24	49
6	JUN	74	R417	1537	1423	1457	LP	-N	5	60	85
6	JUN	74	R426	1407	1541	1626	LP	-B	10	277	380
10	JUN	74	R426	1713	1410	1418	LP	-N	2	51	90
10	JUN	74	R426	1850	1743	1815	LP	-F	3	60	145
14	JUN	74	R426	1417	1857	1904	LP	-U	2	490	490
14	JUN	74	R426	1612	1422	1451	LP	-F	7	47	88
19	JUN	74	R428	1417	1617	1634	LP	-U	2	17	50
21	JUN	74	R428	1433	1435	1445	LP	-N	3	16	51

THE NUMBER OF FLARES CATALOGUED = 177

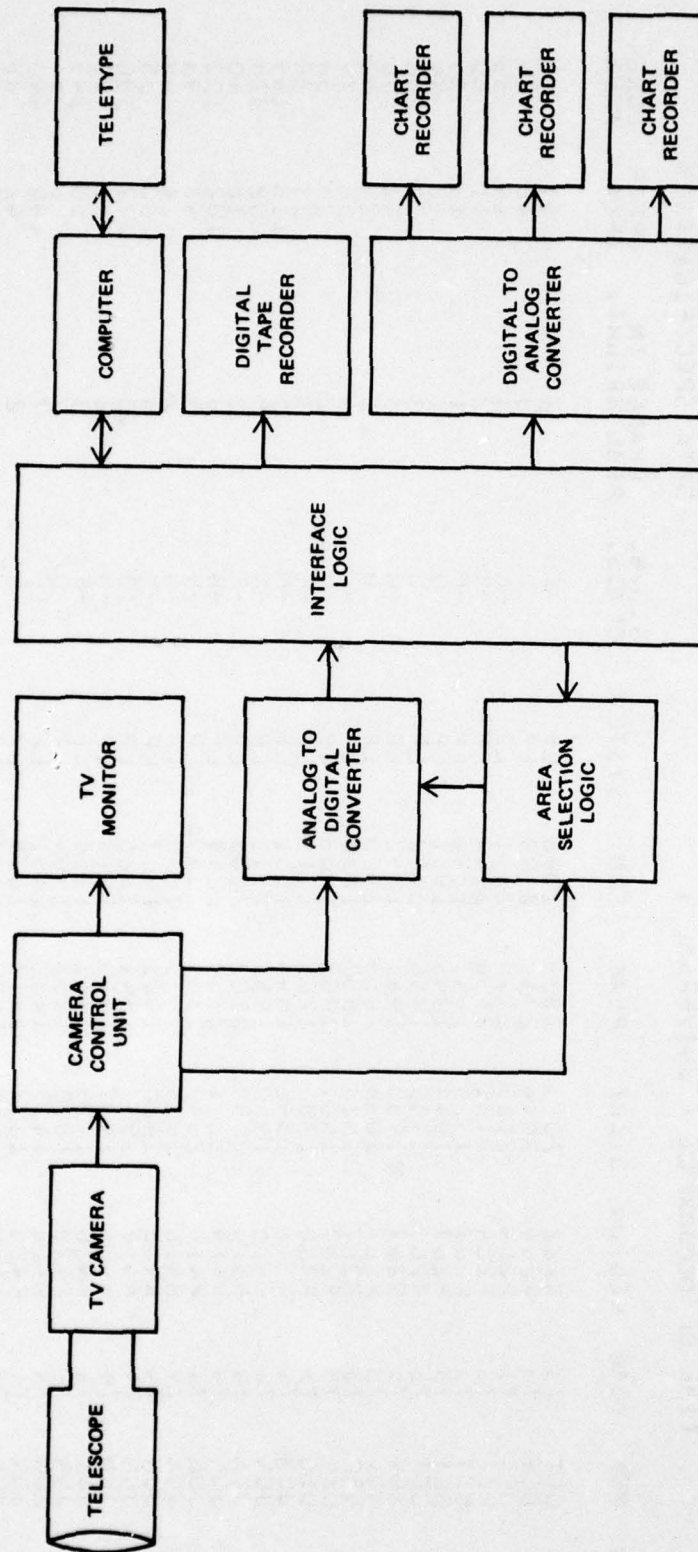


Figure 1. Solar flare data acquisition system.



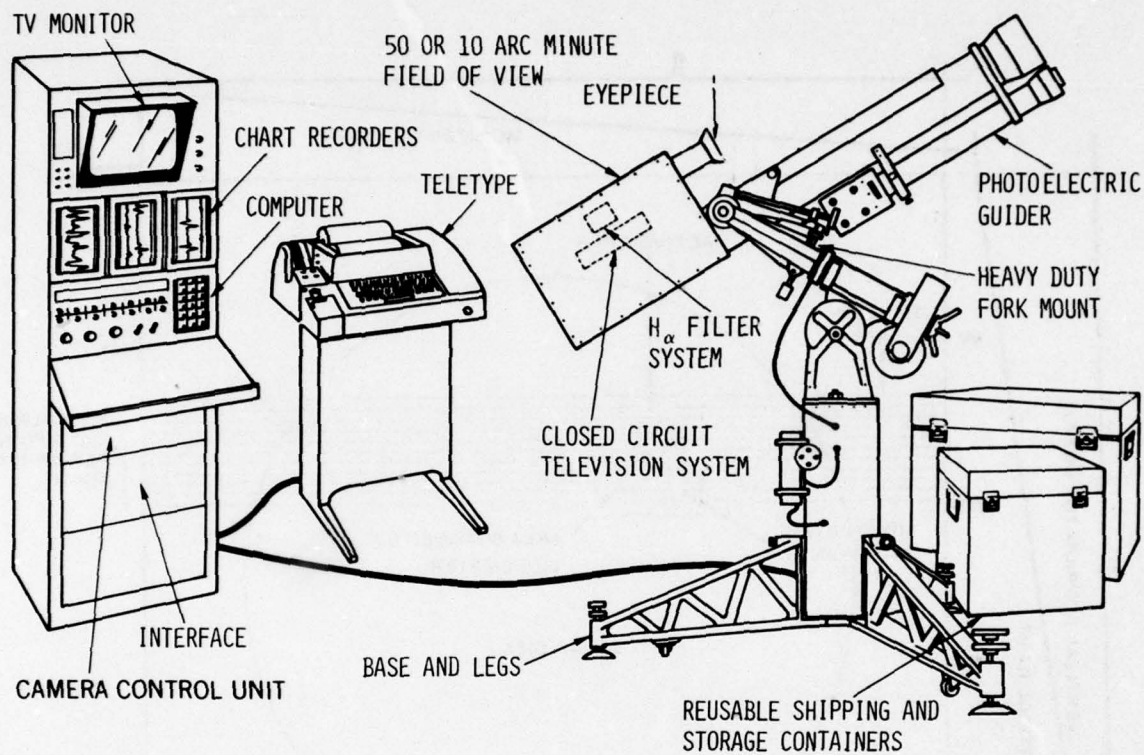


Figure 2. Solar flare digital videometer system.



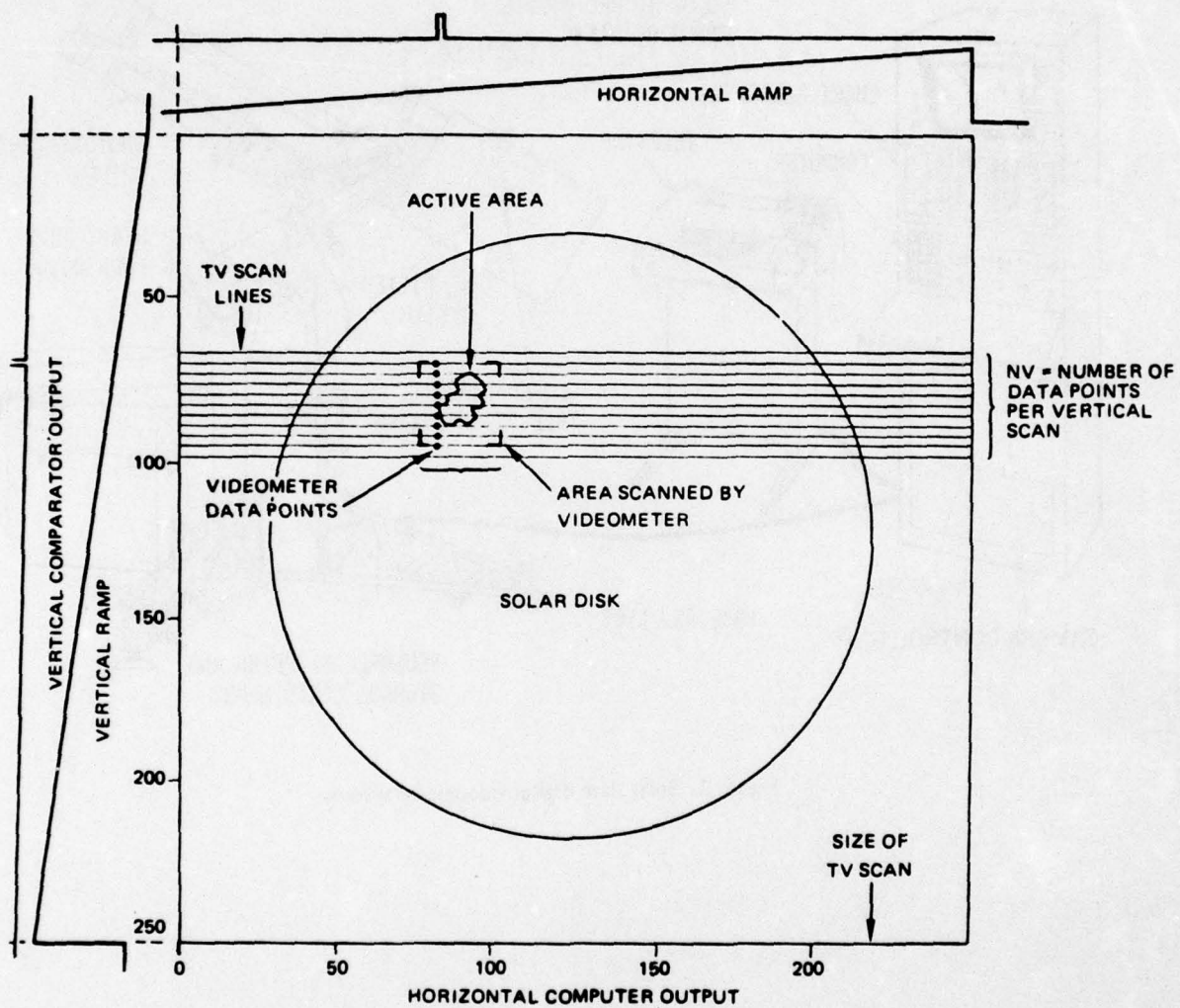


Figure 3. Videometer scan of TV output.

This area-versus-brightness curve is called a "brightness distribution." Notice that this technique discards all positional information within the region. A region which contains a minimum of solar features typically will have a range of brightness values from three to five units wide (see fig 4a), with the largest number of points (area) existing in two or three brightness levels. An active region will have a wider distribution (fig 4a), although the largest number of elements will again lie in two or three brightness levels. The brightness levels below this "average brightness" are indicative of the filamentary and sunspot features, while the higher brightness levels correspond to the plage region. A flare, viewed optically, is typically seen as an increase in the maximum brightness level, as well as enhanced areas in the brighter plage regions. Figure 4b shows data from the system collected at the peak of a flare on 12 March 1972. The dashed curve is the pre-event brightness distribution and is used as the reference level from which the flare data are measured. The brightness distribution of the region at flare maximum falls beneath the solid line in the figure, with the actual flare defined as the increased area in the brighter (higher) levels. Time histories for optical flaring events are then readily available by performing the subtraction of the pre-flare distribution from the flaring distribution, as indicated above for each measurement. By varying the lowest bin used in the actual flare area, subtractions can look at the strictly energetic portion (higher brightness levels) or include the more diffuse and less bright flaring region (lower flare brightened levels; fig 4b). Figure 5 shows the time variations of the distribution from the active region, which gave a 3B flare on 24 January 1971.

#### DATA DESCRIPTION

Table 1 gives a summary of the flare data recorded by the videometer systems, spanning a time range from early 1971 through June 1974. During this period the videometer systems were undergoing design development and so the data cannot strictly be intercompared throughout. The 24 January 1971 data were taken during the very early design phase, and must stand alone. The data from 5-7 May 1972 were taken with both systems from the La Posta Astrogeophysical Observatory at Campo, CA; in this same series, the data from 8-18 May 1972 were with the videometer separated, system B being located in Saugus, CA. Between May and October 1972, the systems were improved by installing new, more sensitive video amplifiers, and so the following data (October 1972 - June 1974) also must be considered separately. The shape of the time histories should be comparable throughout the whole data set—it is the actual values that cannot be intercompared. The upper and lower flare areas indicated in the table are those corresponding to the higher and lower thresholds (bin level), respectively, used in the distribution subtraction process. If the numbers are the same, it indicates that the pre-event active region did not show enough contrast to the distinguished two thresholds. The profiles are all presented with respect to the lower threshold.

#### TIME PROFILES

The time profile plots (fig 6 and beyond) contain both the flare "area" and the peak brightness variations. The area scale is on the left and the peak brightness (or "peak") is on the right; the area curve is above the peak curve.



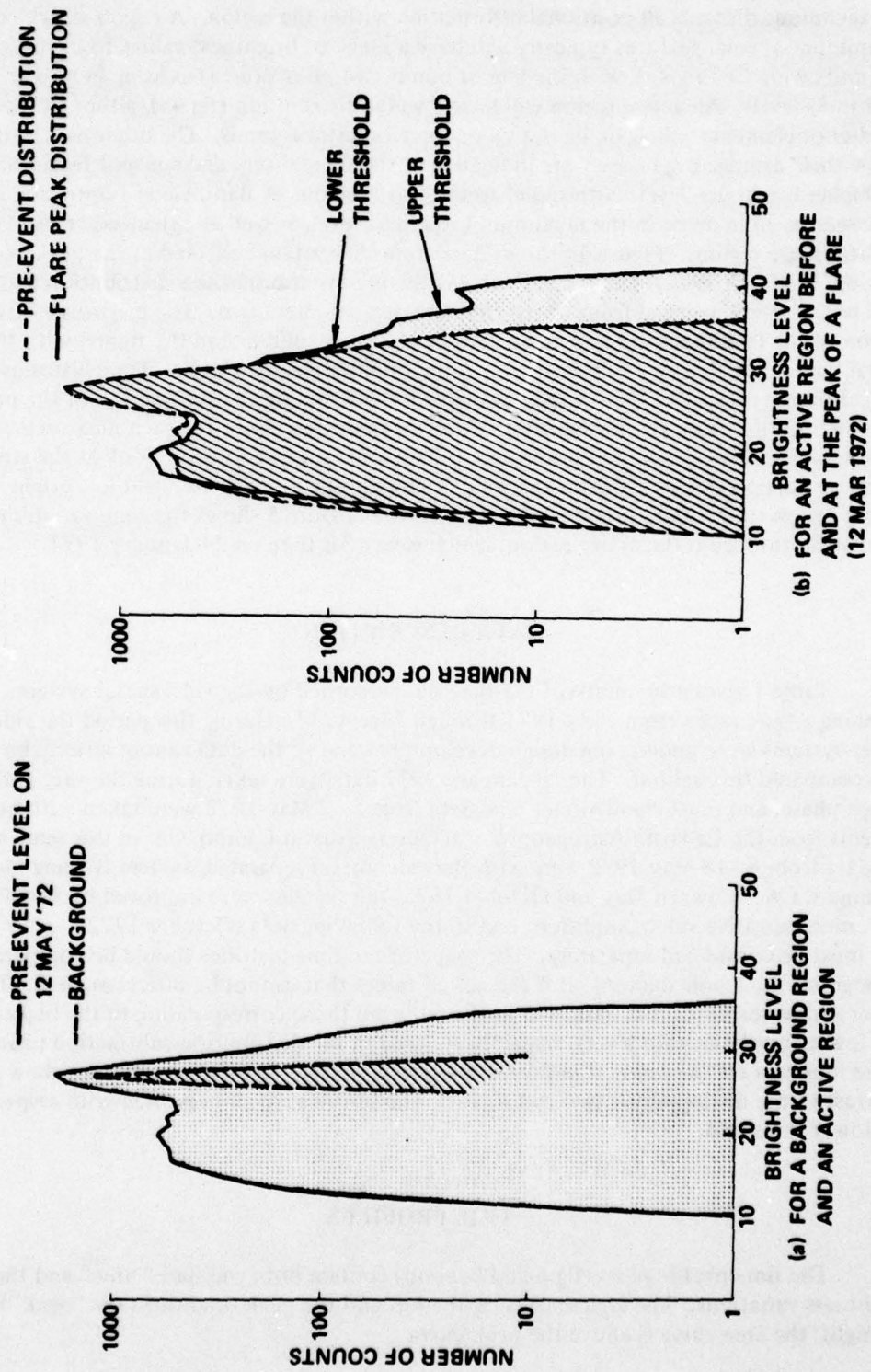


Figure 4a-b. Brightness distributions.

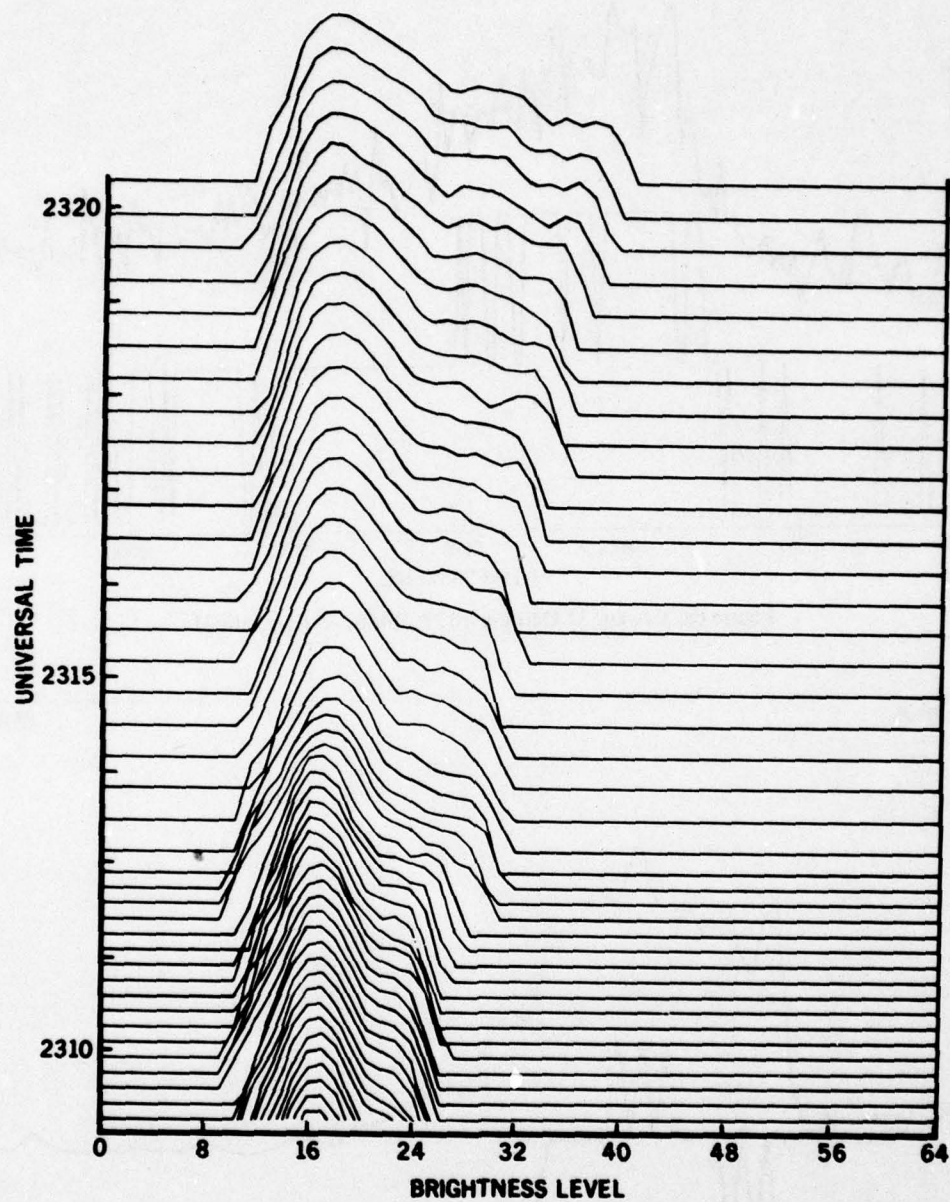


Figure 5. 2-B flare, 24 January 1971.



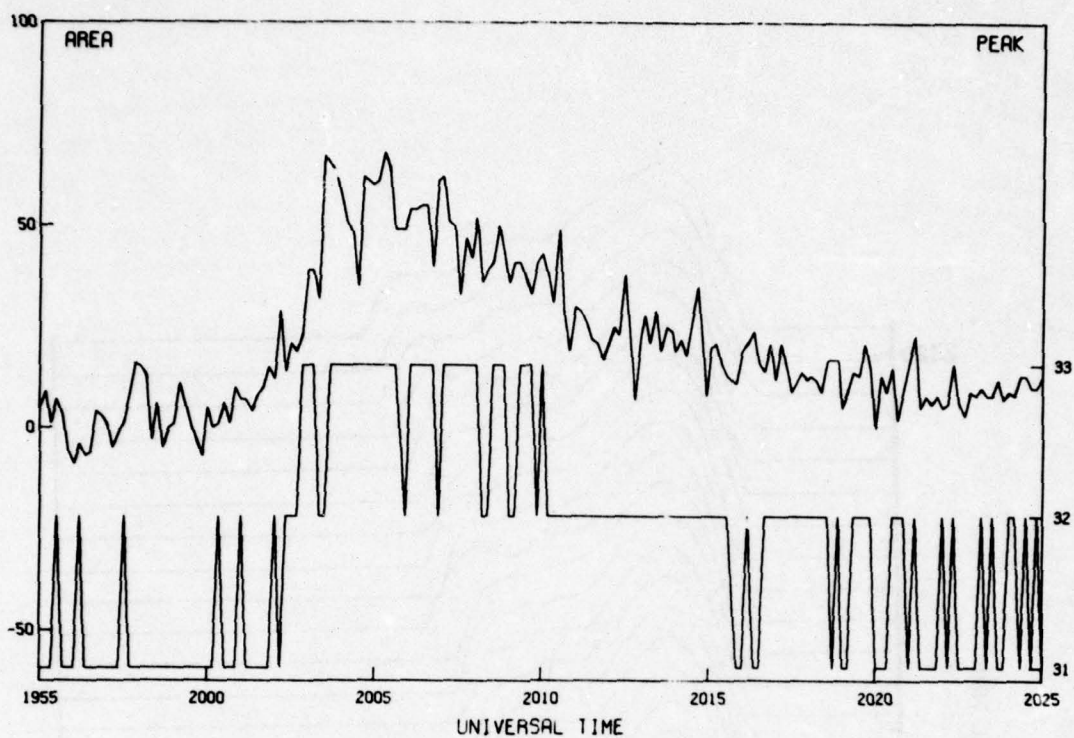


Figure 6a. Hawaii, 31 October 1972; R460, -F flare, bin 31.

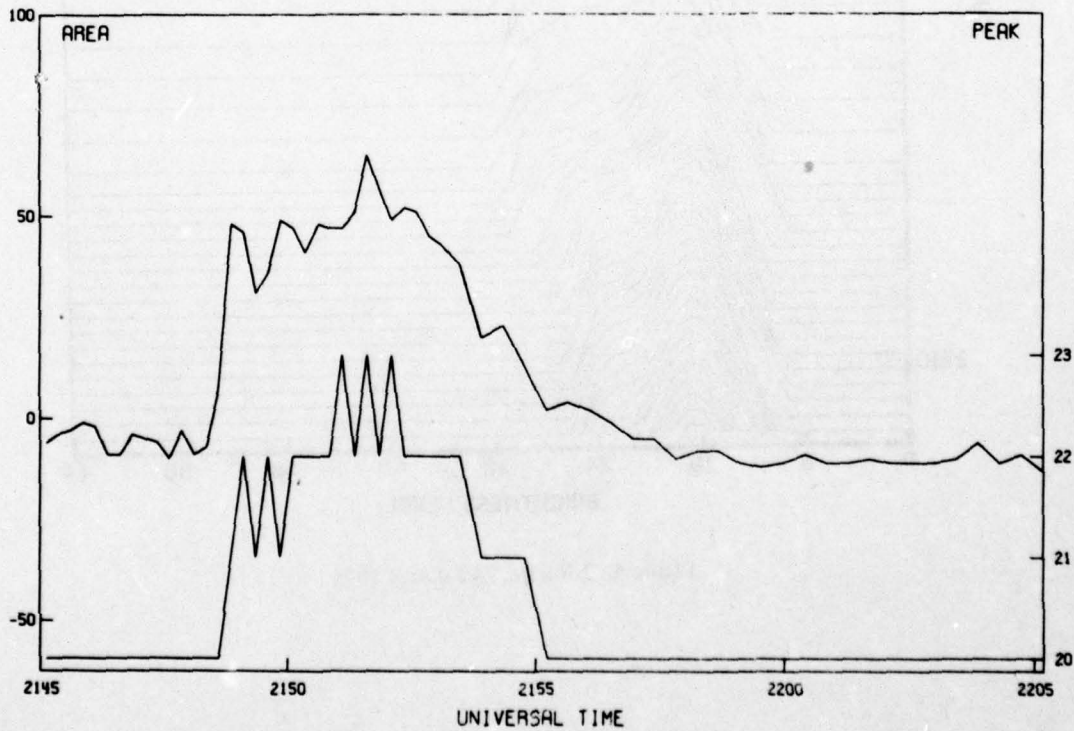


Figure 6b. La Posta, 2 May 1973; R092, -N flare, bin 20.

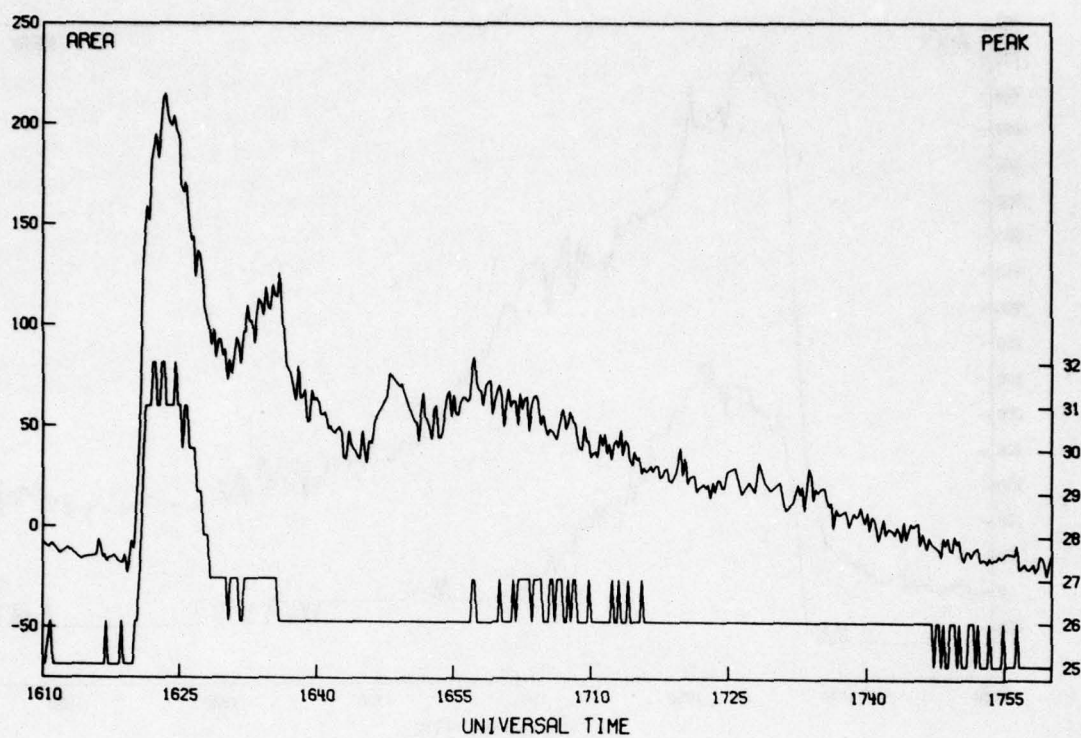


Figure 6c. La Posta, 11 April 1973; R077, -B flare, bin 25.

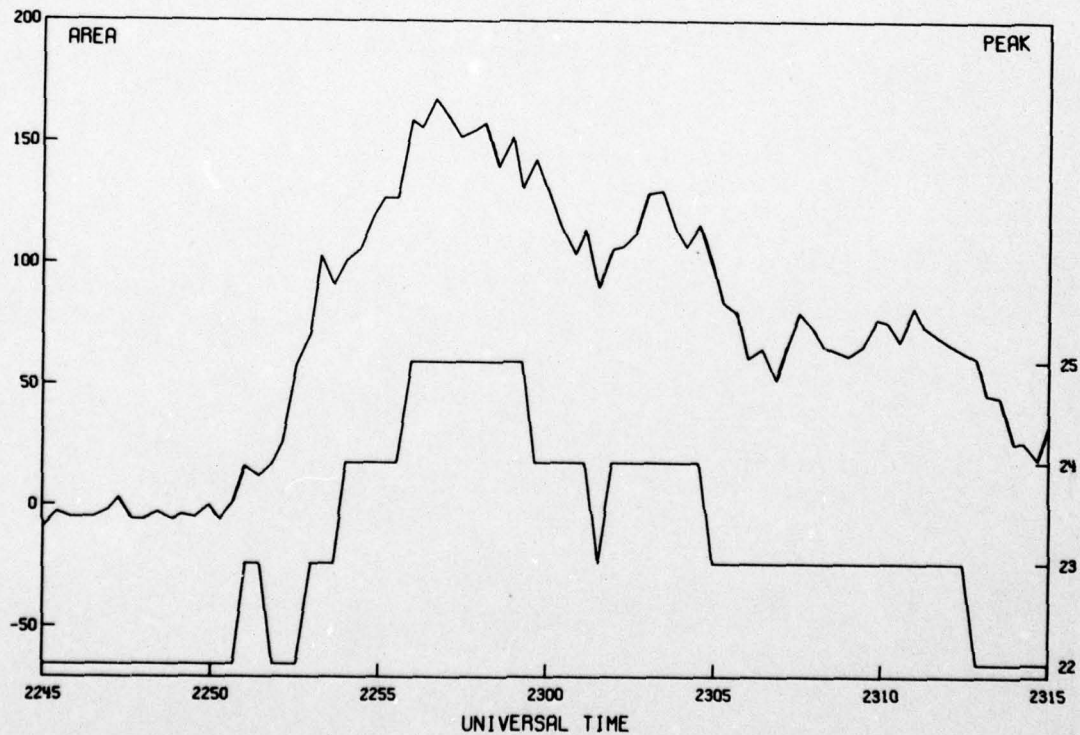


Figure 6d. La Posta 7 April 1973; R078, 1N flare, bin 22.

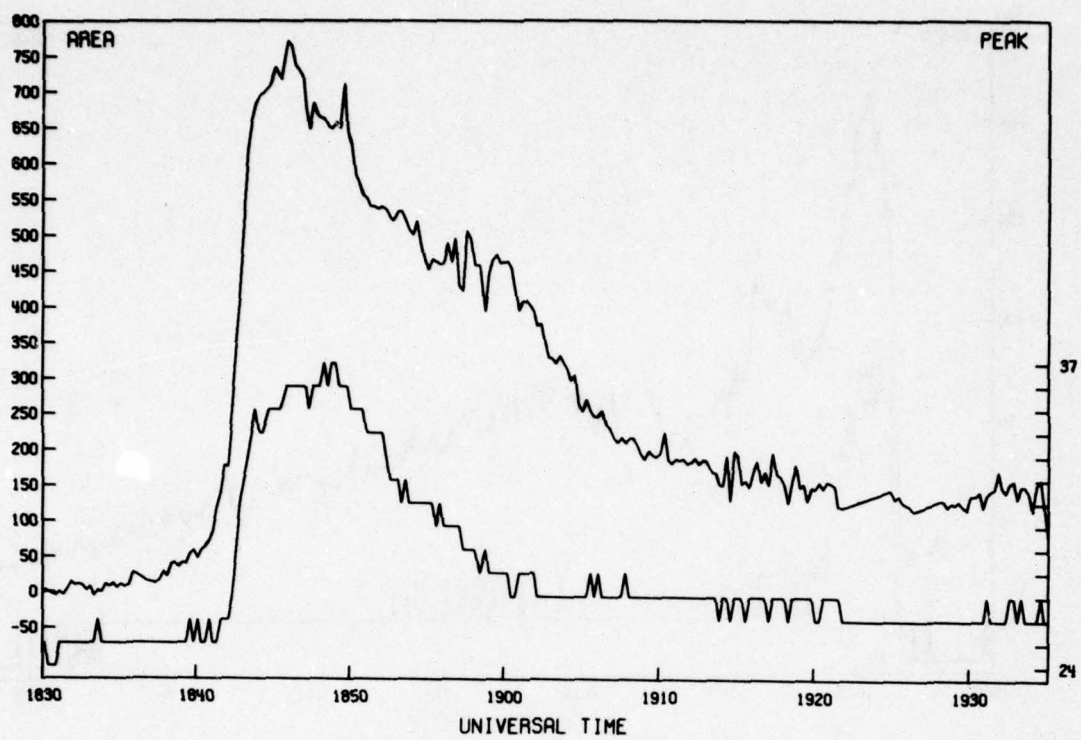


Figure 6e. La Posta, 11 April 1973; R077, 1B flare, bin 24.



Rather than discuss each of the 150 events separately, the authors have chosen specific sample events, both "classical" and "anomalous." The standard classification of solar flares has an area scale from the type 0 (or -) subflare to the largest (type 4) flare. There is also a brightness classification, ranging from faint (F) through normal (N), to bright (B). Our choice of representative classical events ranges from a -F to a 1B, and can be seen in fig 6a-e. These events rise rapidly, reach a definite peak, and have a smooth monotonic return to the pre-event level. Notice that the time, peak, and area axes are not similar from event to event, but rather are scaled to keep each event filling the plot. These events were chosen so that the classification from solar geophysical data (the labeled classification) corresponds to the size and brightness measured by the videometer, in the sense that subflares are smaller than type 1 flares, etc.

The videometer and solar geophysical data do not always agree on event classification, however, as indicated in fig 7a-d.

Figure 7a is a classified -F flare that had very large enhanced areas and brightness increases, but apparently because of the long time to the event peak ( $\sim 1\frac{1}{2}$  hr), the event slipped by observers virtually unnoticed. The -N (fig 7b-c) appears to have no such problem, and in profile shape appears "classic." Although its area is less than a 2B that followed (fig 7d;  $\sim 300$  vs  $\sim 1350$ ), the brightness variations are actually greater.

The preceding "anomalous" events have been included to stress the usefulness of the digitized time profiles.

The next two figures (8a-b and 9a-b) show flare data collected during the La Posta-Hawaii separation test. There was an unfortunately small amount of simultaneous flare data because of the small number of events and the lack of simultaneity in solar observing periods.

Figures 10a-d are a series of flares happening on 25 October 1972 from region 460. These events are well behaved in that subflares are smaller than type 1 flares and B flares are brighter than N flares. None of the events was long-lived; notice that the 1B is gone within  $\sim 5$  minutes of its start.

In the data presentation, circles at data points indicate shifts in the background average brightness of greater than one bin; data gaps are indicative of extreme background shifts (usually  $>5$ ). Shifts in the background level tend to come from obscurations of the sun (clouds, etc), and if these changes are too large, we expect our normalization routines to be unreliable.

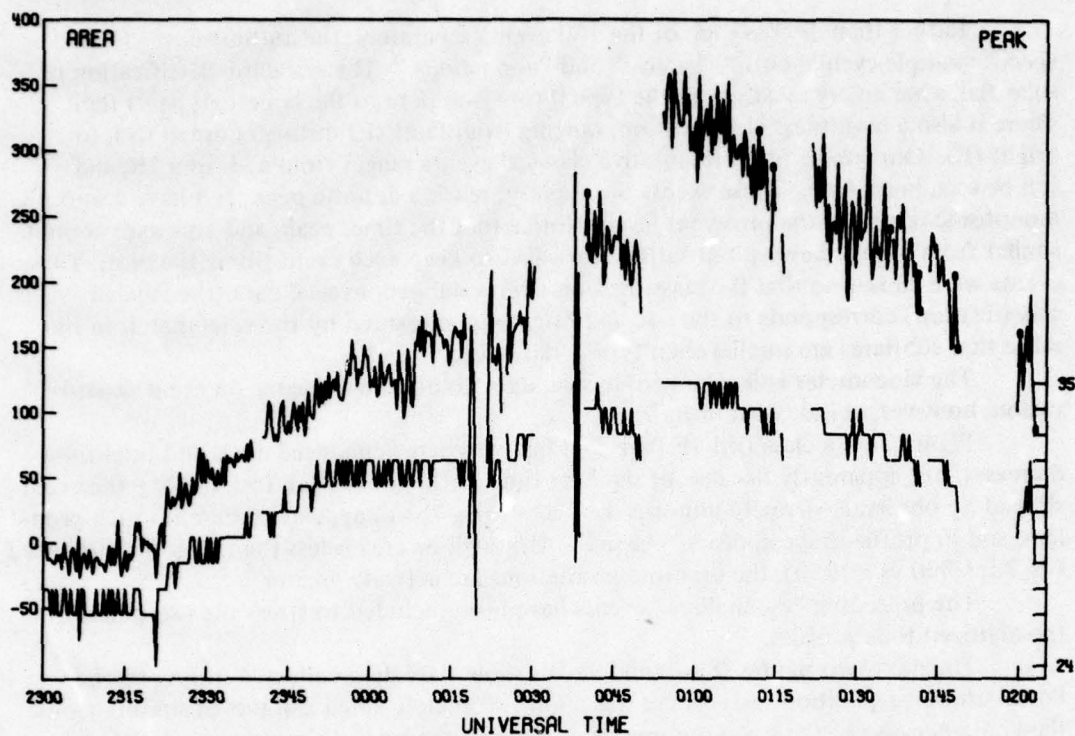


Figure 7a. Hawaii, 24 October 1972; R448, -F flare, bin 26.

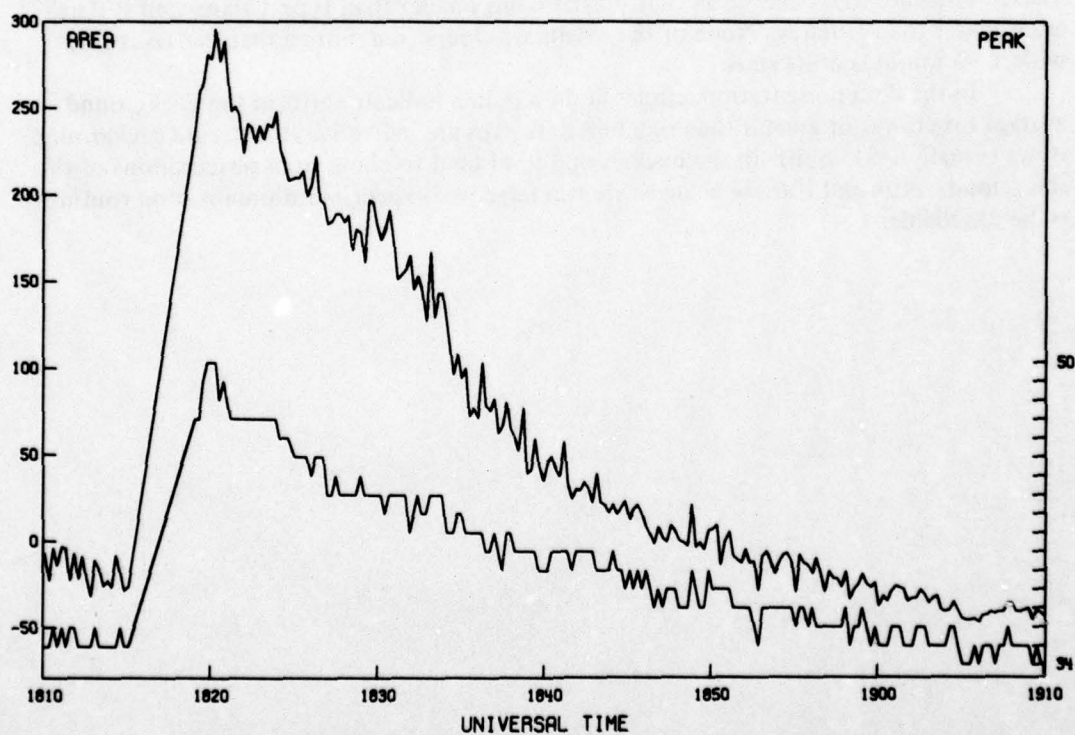


Figure 7b. La Posta, System A, 10 May 1972; R176, -N flare, bin 34.

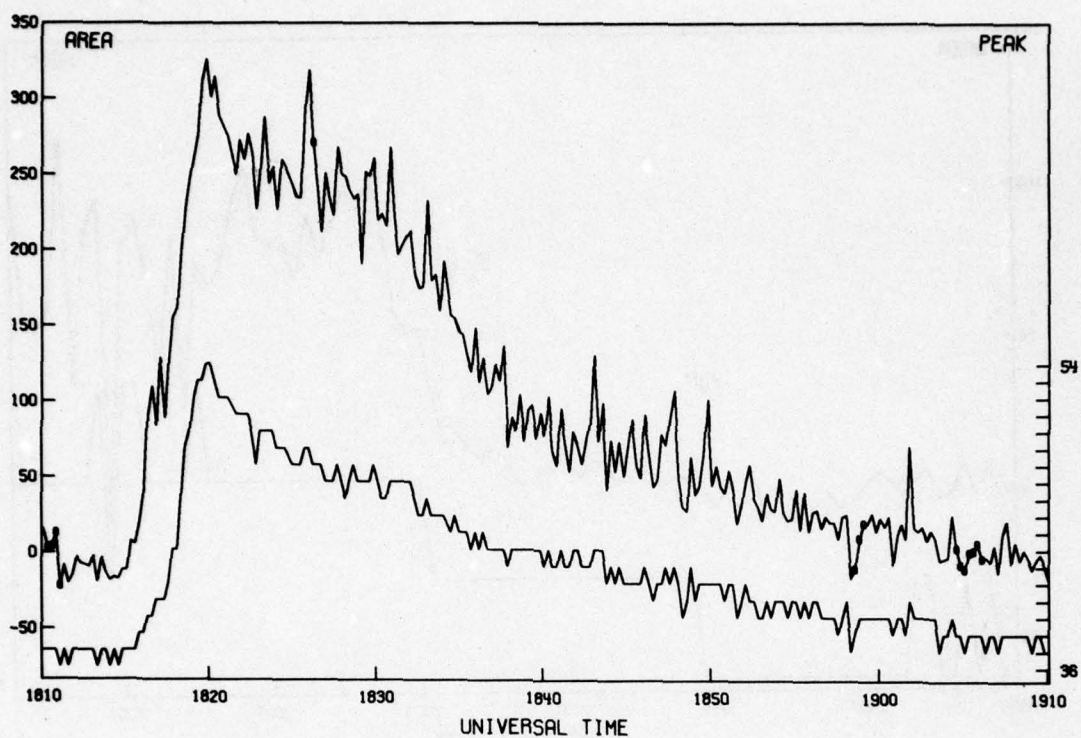


Figure 7c. La Posta, System B, 10 May 1972; R176, -N flare, bin 36.

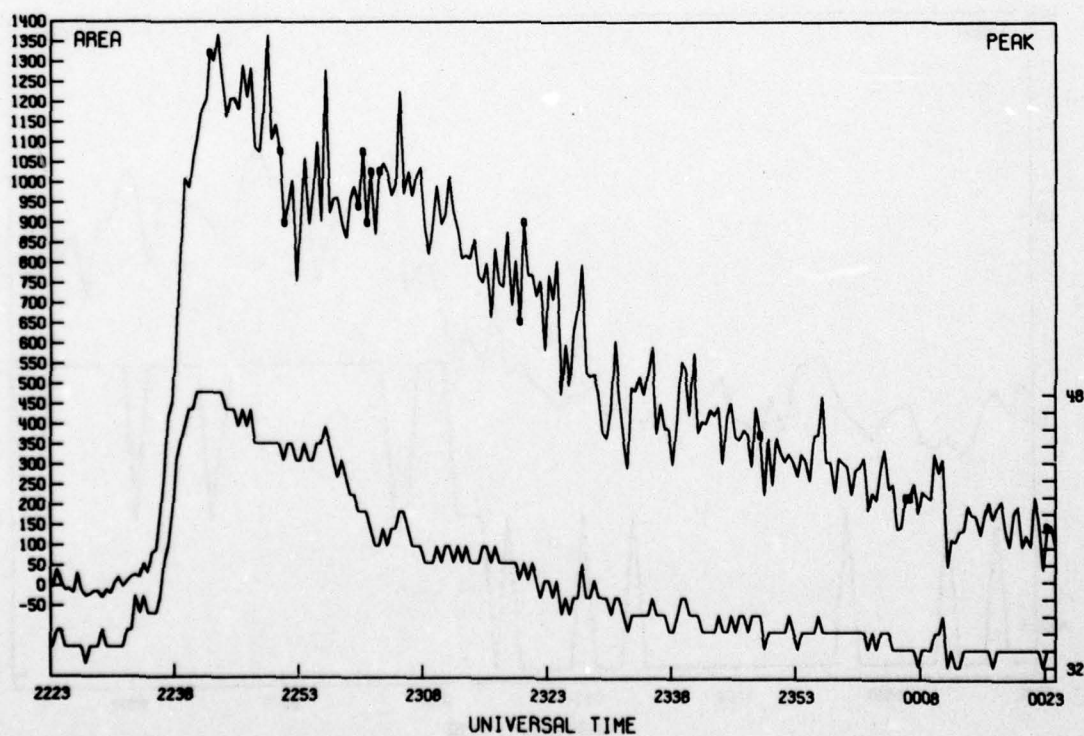


Figure 7d. La Posta, System B, 17 May 1972; R195, 2B flare, bin 30.



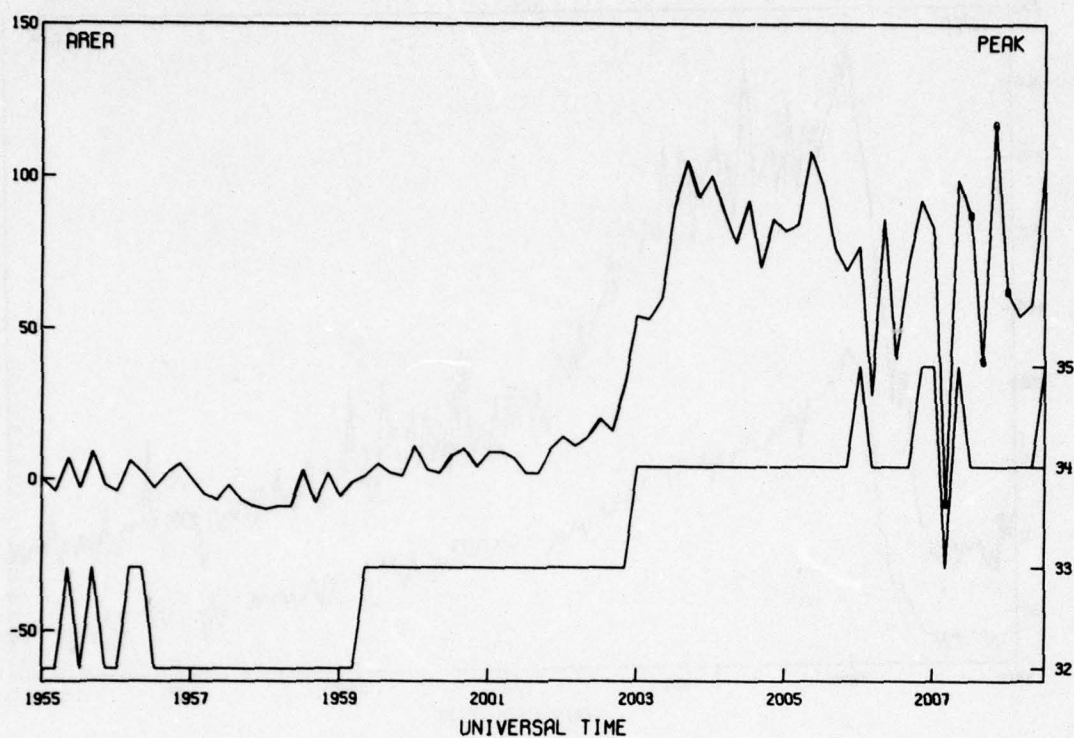


Figure 8a. La Posta, 31 October 1972; R460, -F flare, bin 32.

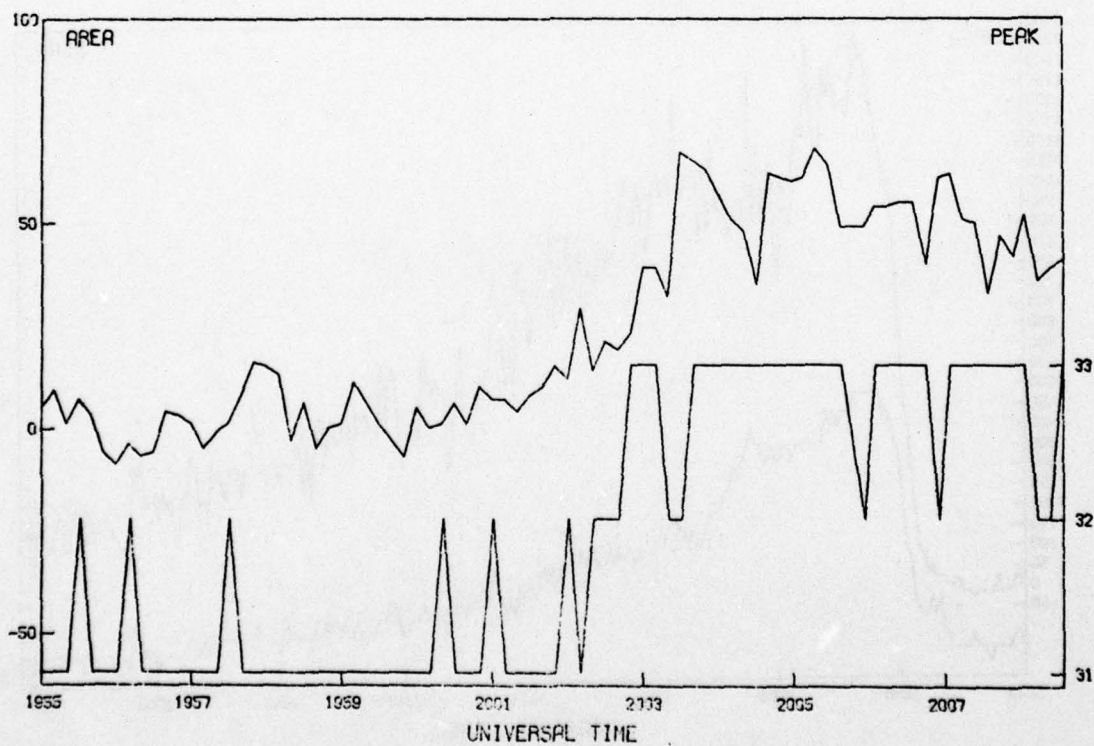


Figure 8b. Hawaii, 31 October 1972; R460, -F flare, bin 31.

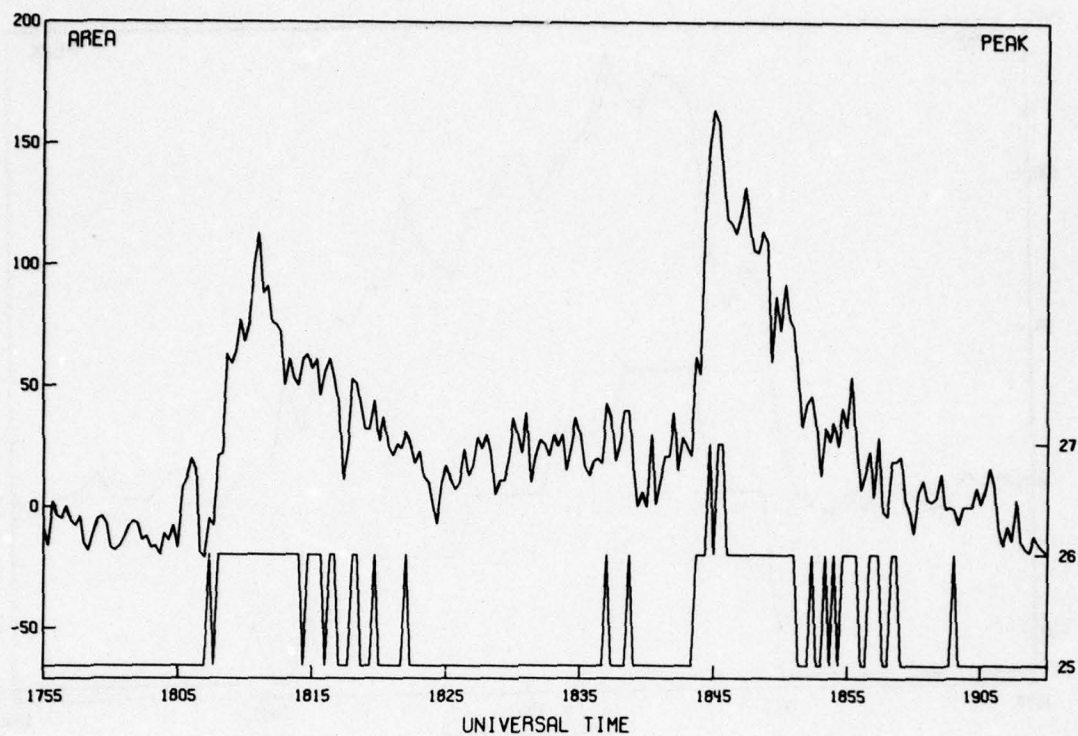


Figure 9a. La Posta, 10 September 1973; R219, U -F flares, bin 25.

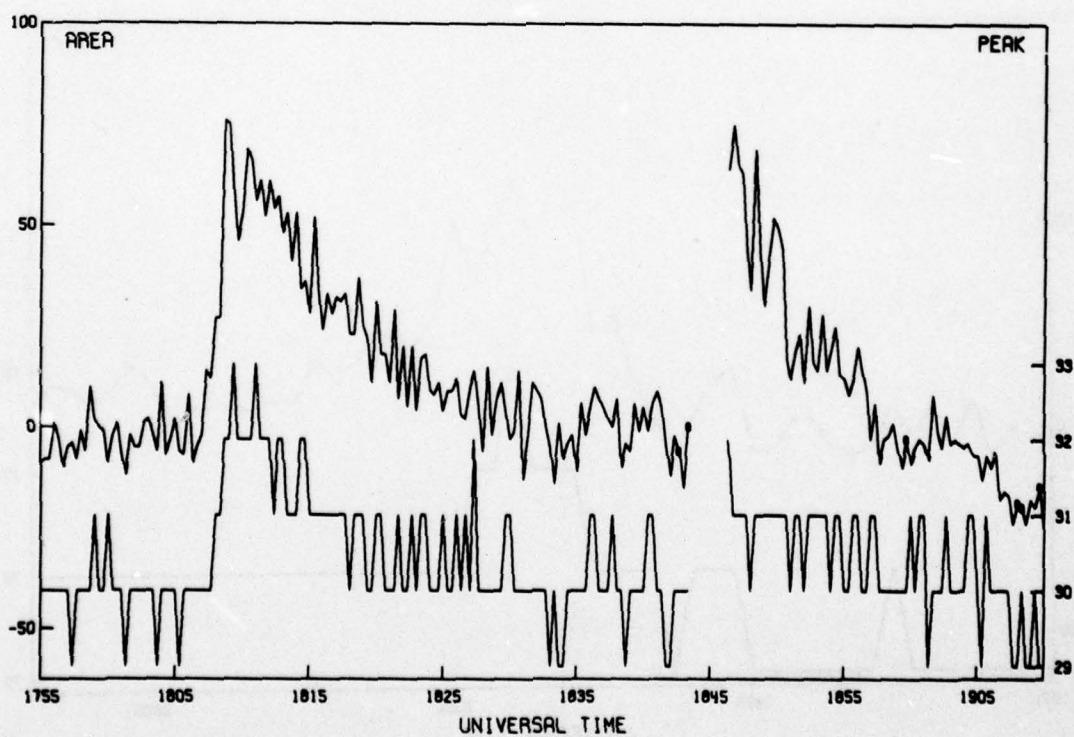


Figure 9b. Hawaii, 10 September 1973; R219, U -F flares, bin 29.

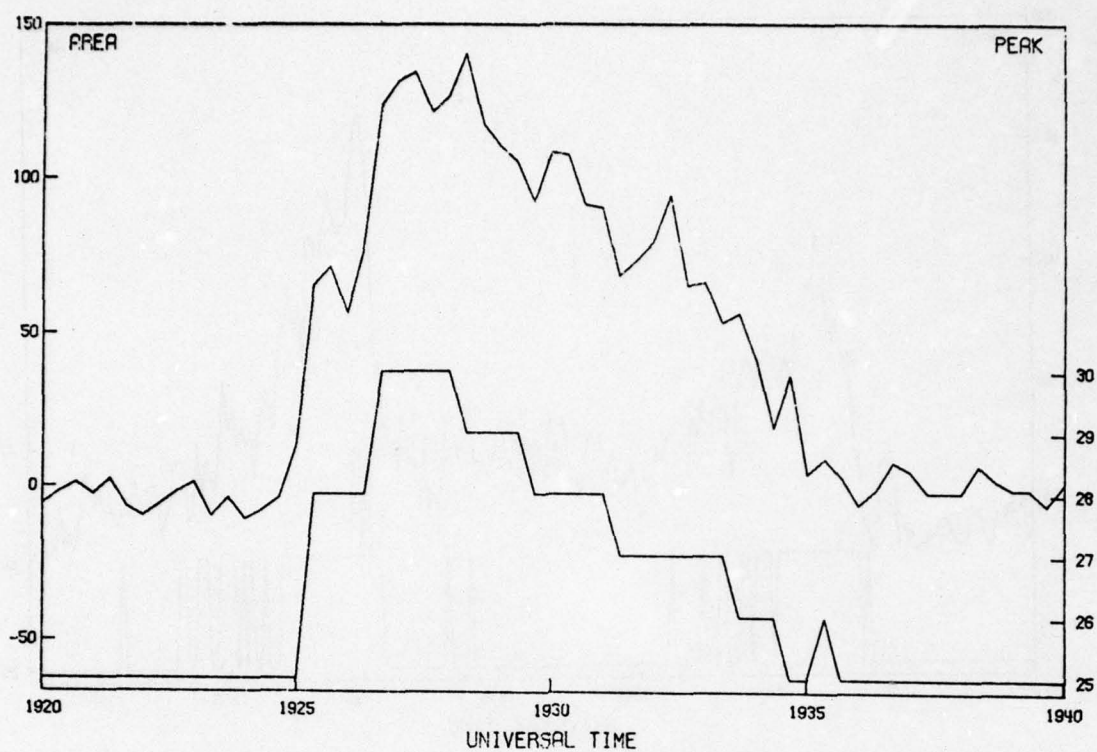


Figure 10a. La Posta, 25 October 1972; R460, -B flare, bin 25.

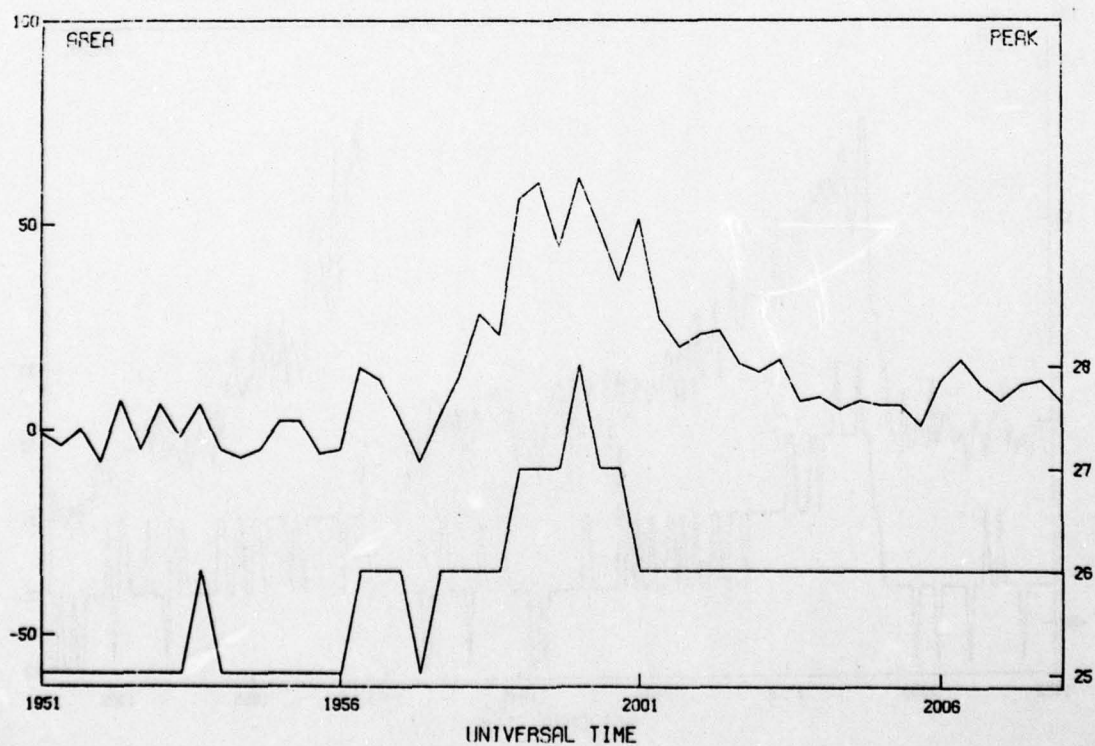


Figure 10b. La Posta, 25 October 1972; R460, -N flare, bin 25.



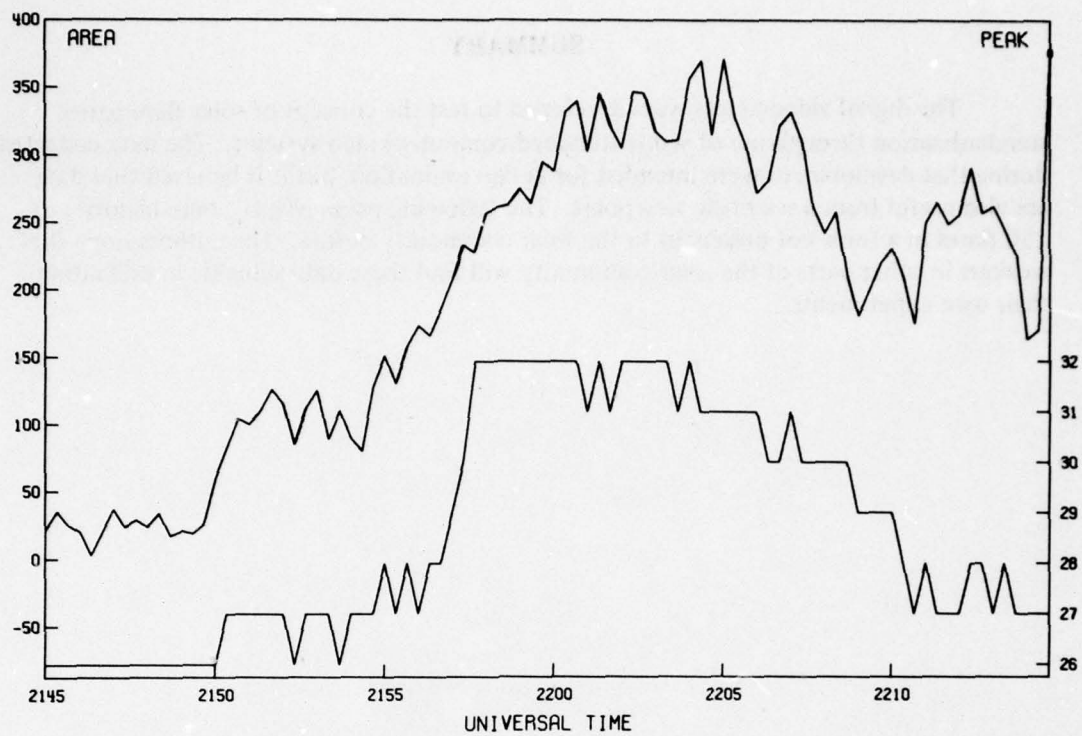


Figure 10c. La Posta, 25 October 1972; R460, 1N flare, bin 25.

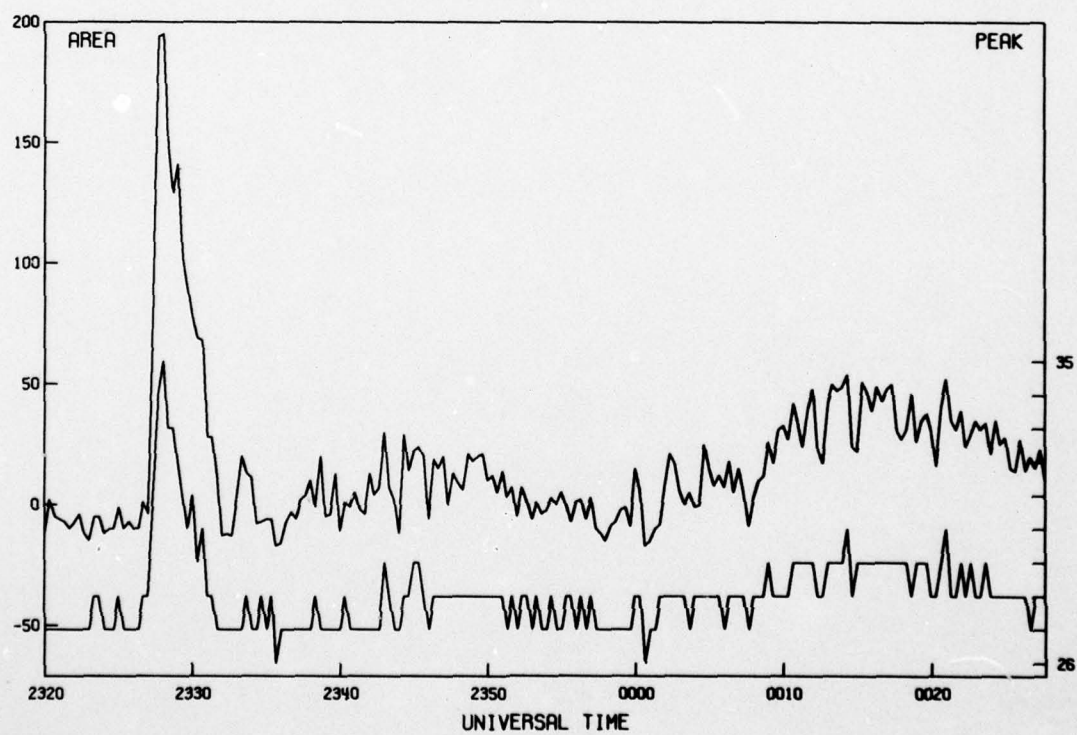


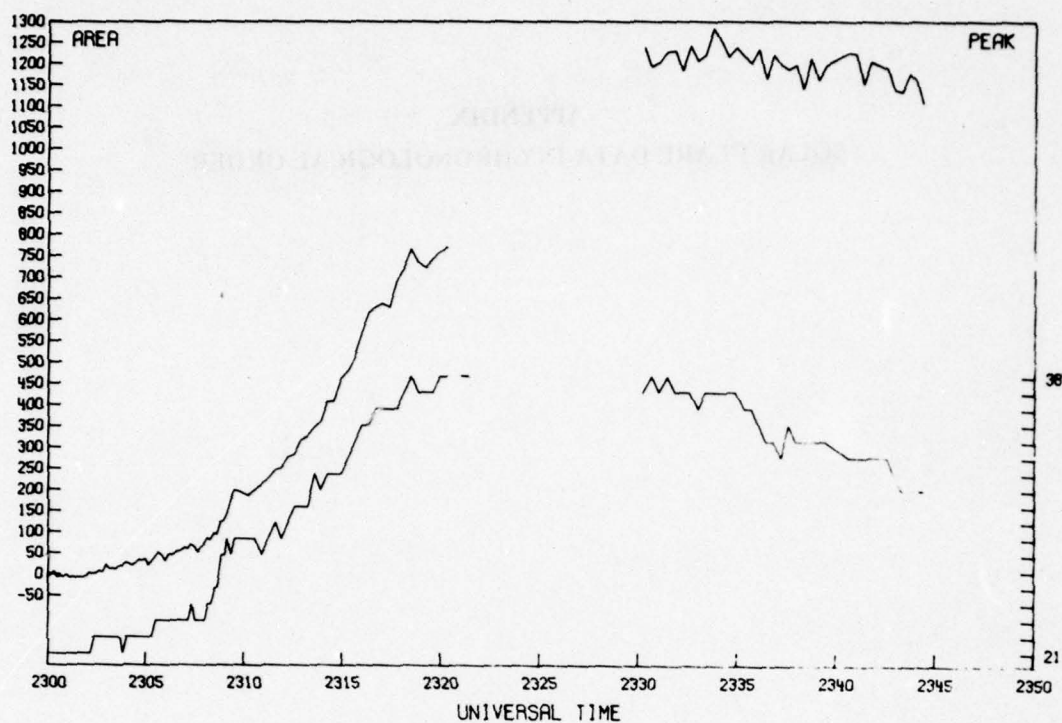
Figure 10d. La Posta, 25 October 1972; R460, 1B -N -N flares, bin 27.

## SUMMARY

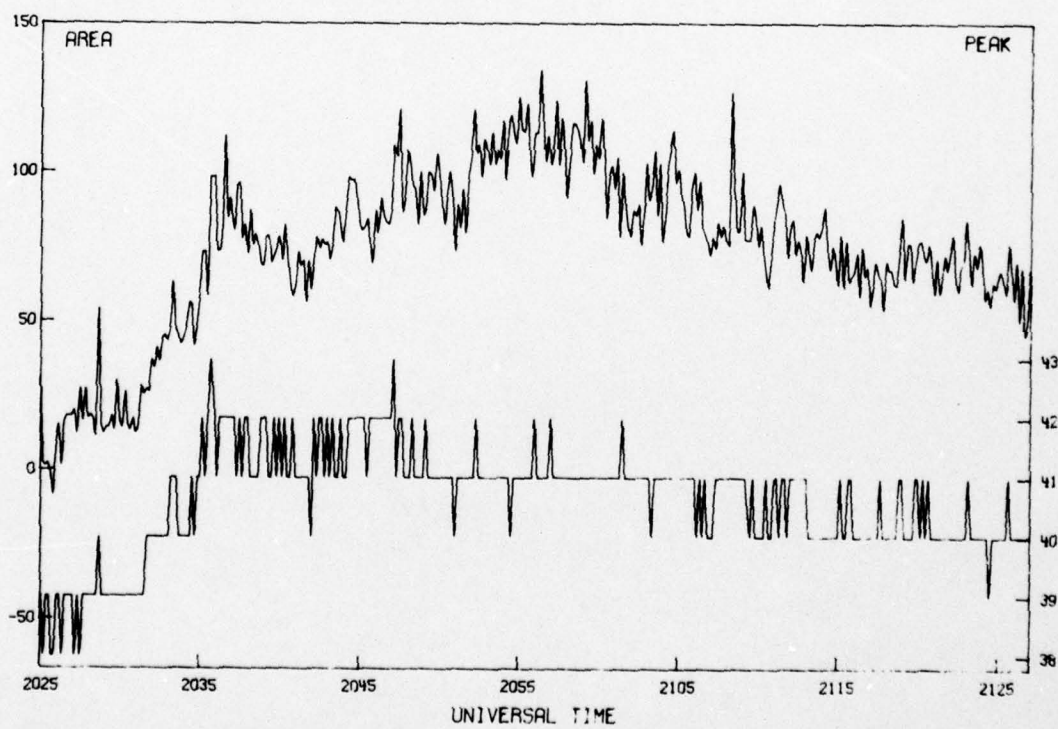
The digital videometers were developed to test the concept of solar flare patrol standardization through use of semiautomated computer-video systems. The data collected during that development were intended for design evaluation, but it is believed that data are also useful from a scientific viewpoint. The following pages give  $H_{\alpha}$  time histories of 150 flares in a form not presented to the solar community before. The authors hope that workers in other parts of the solar community will find these data valuable in evaluating their own experiments.

**APPENDIX**  
**SOLAR FLARE DATA IN CHRONOLOGICAL ORDER**

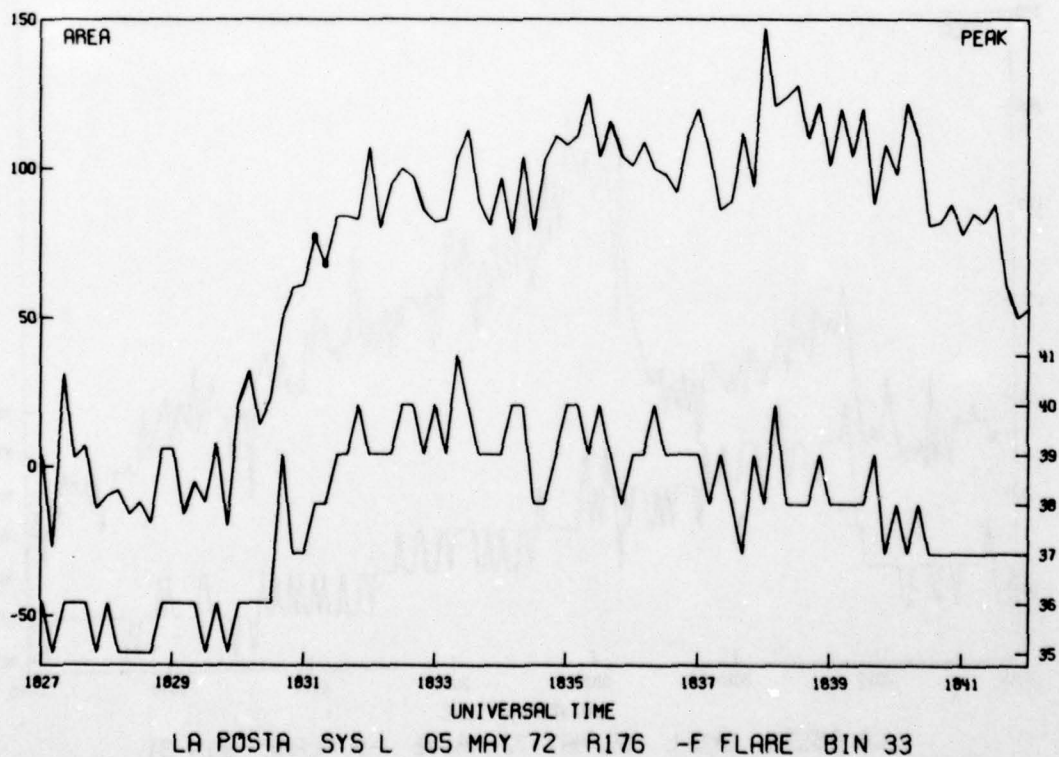
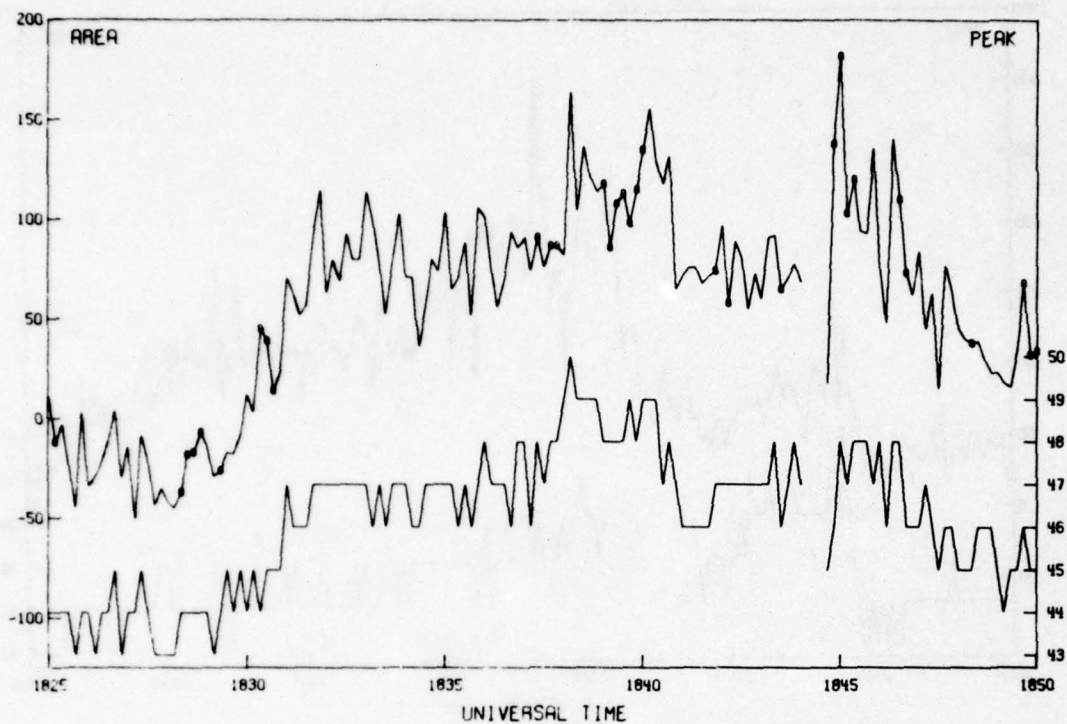


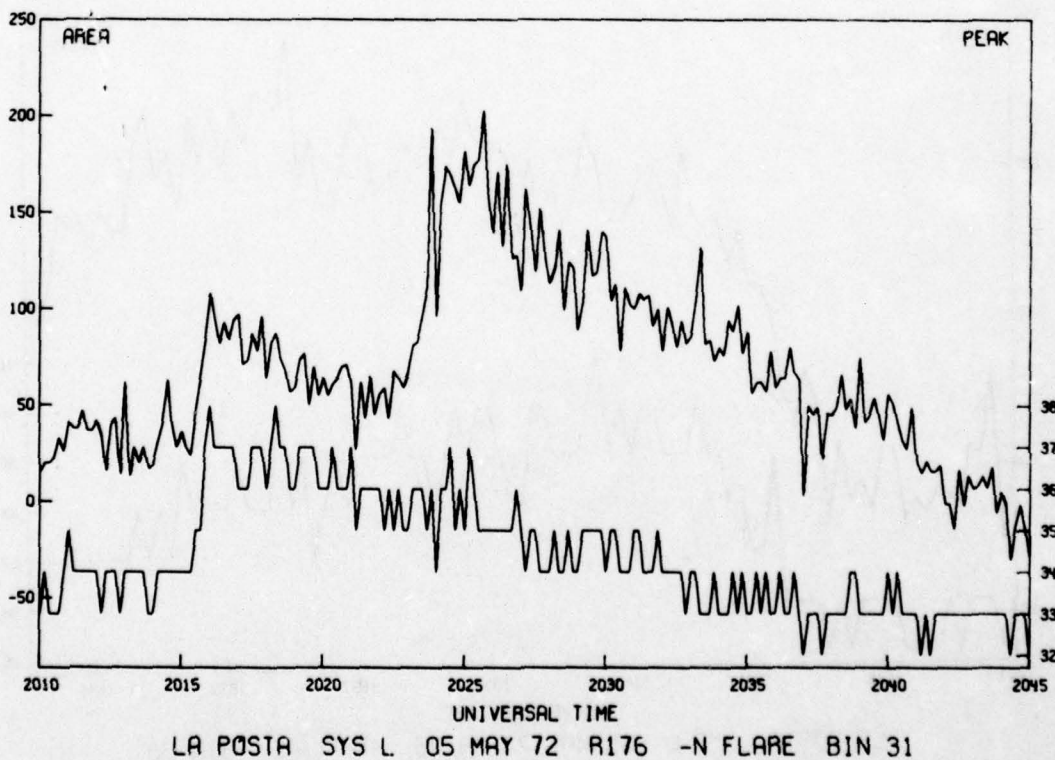
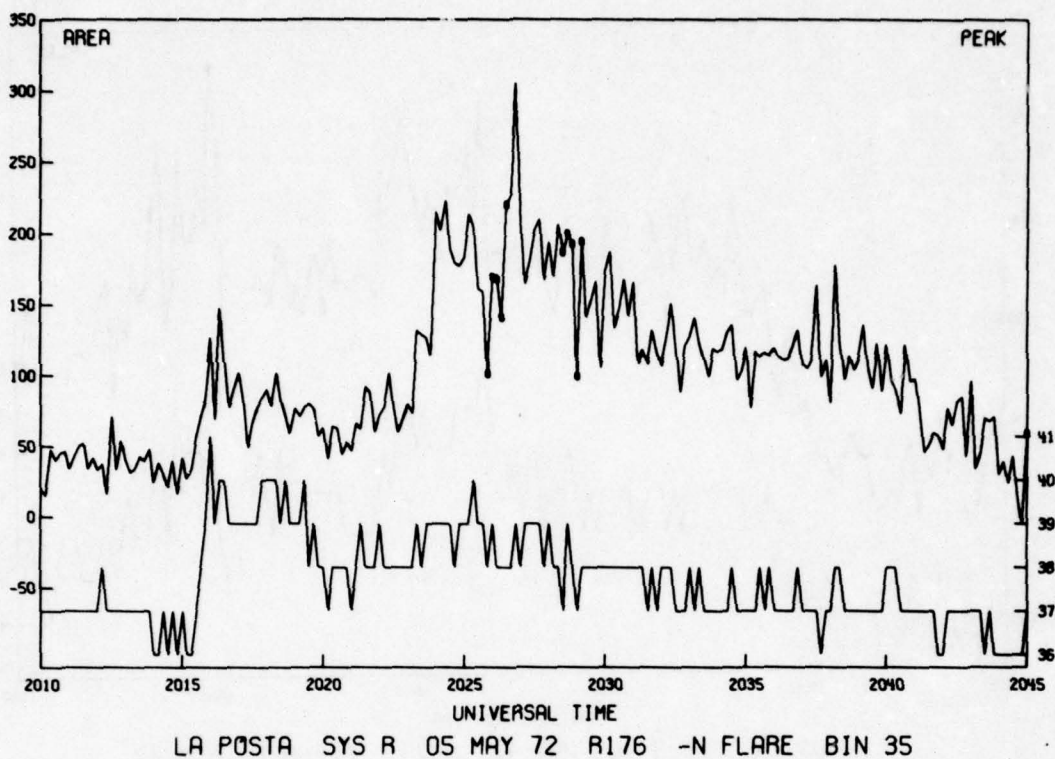


LA POSTA 24 JAN 71 3B FLARE BIN 21

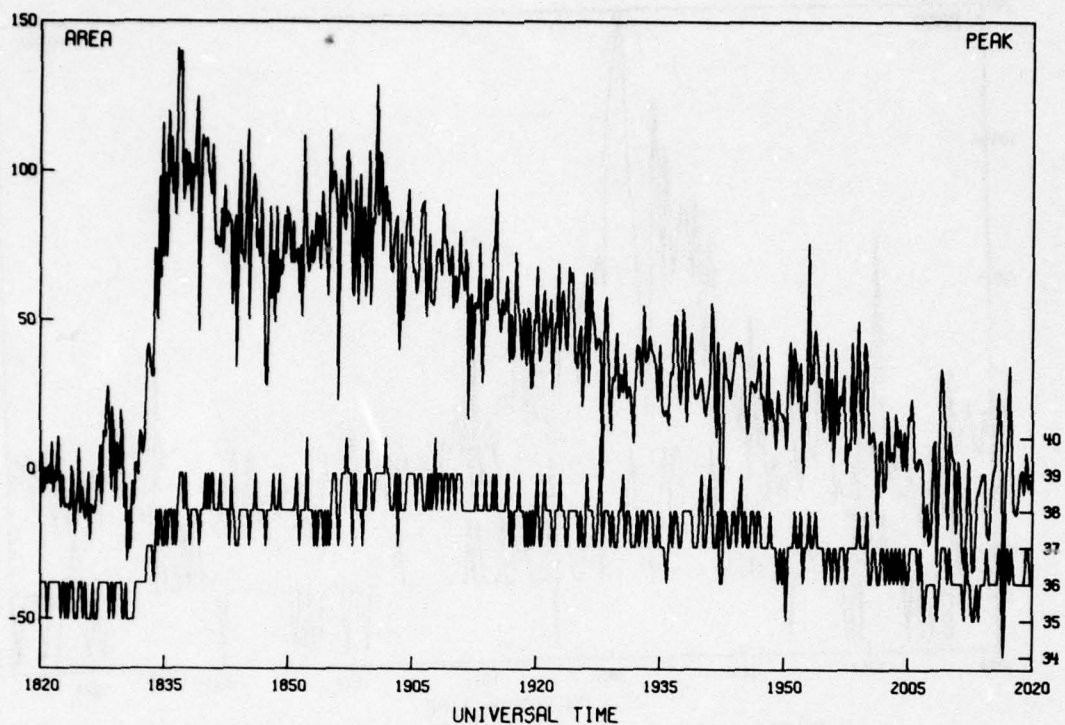


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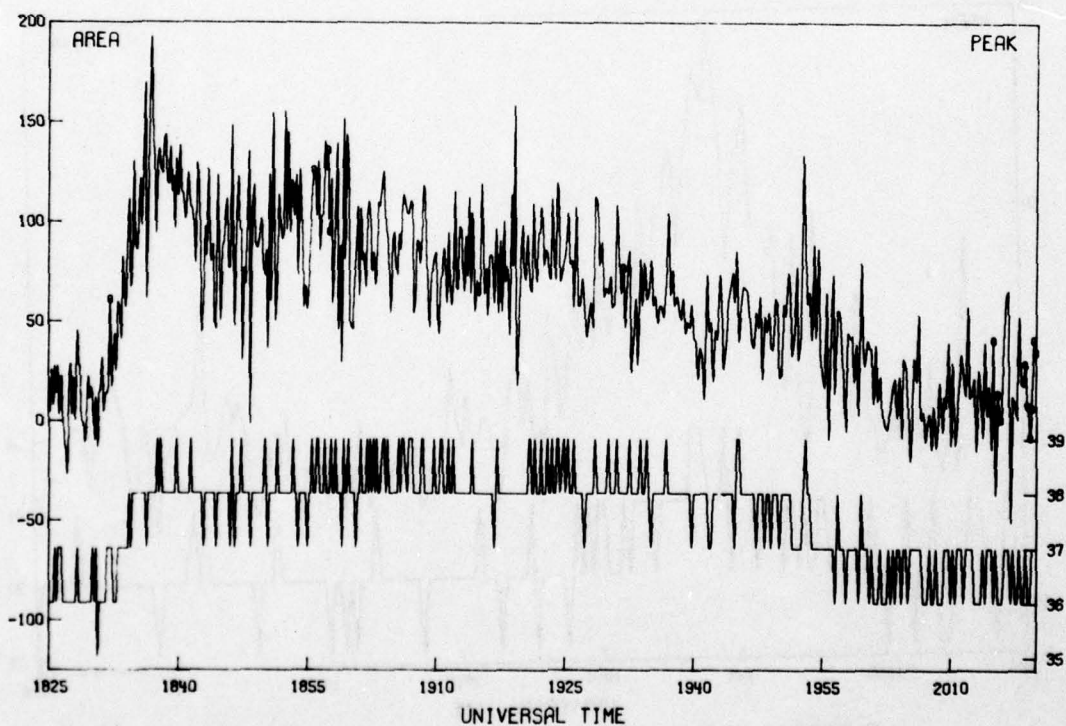




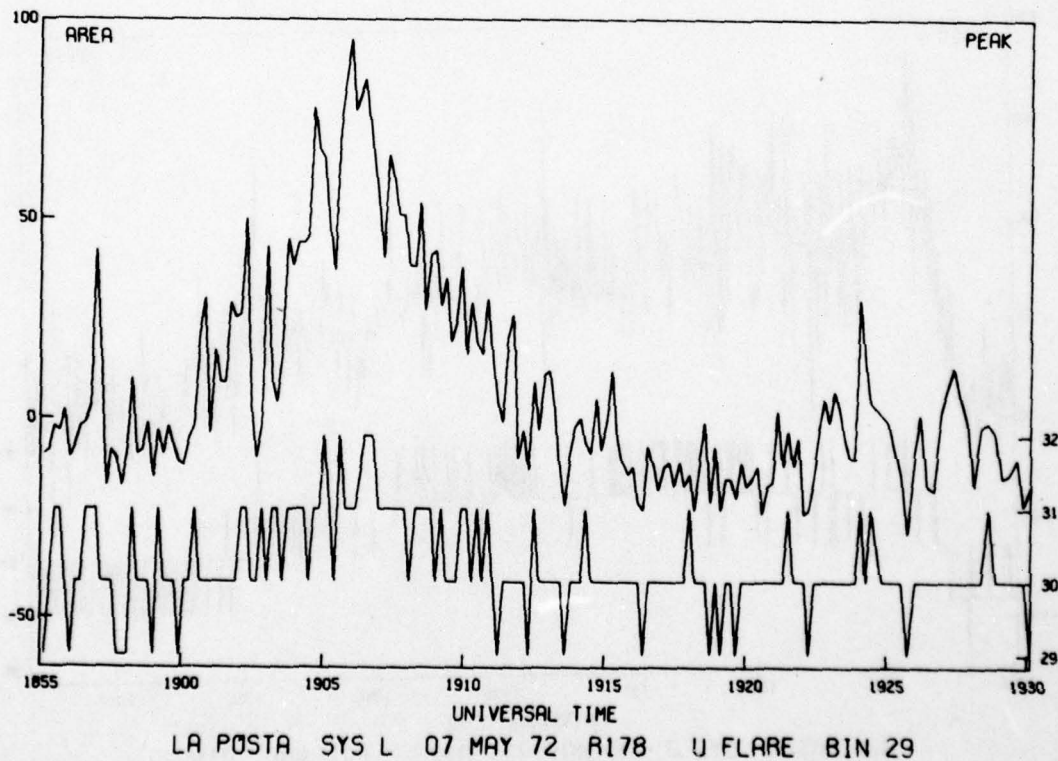
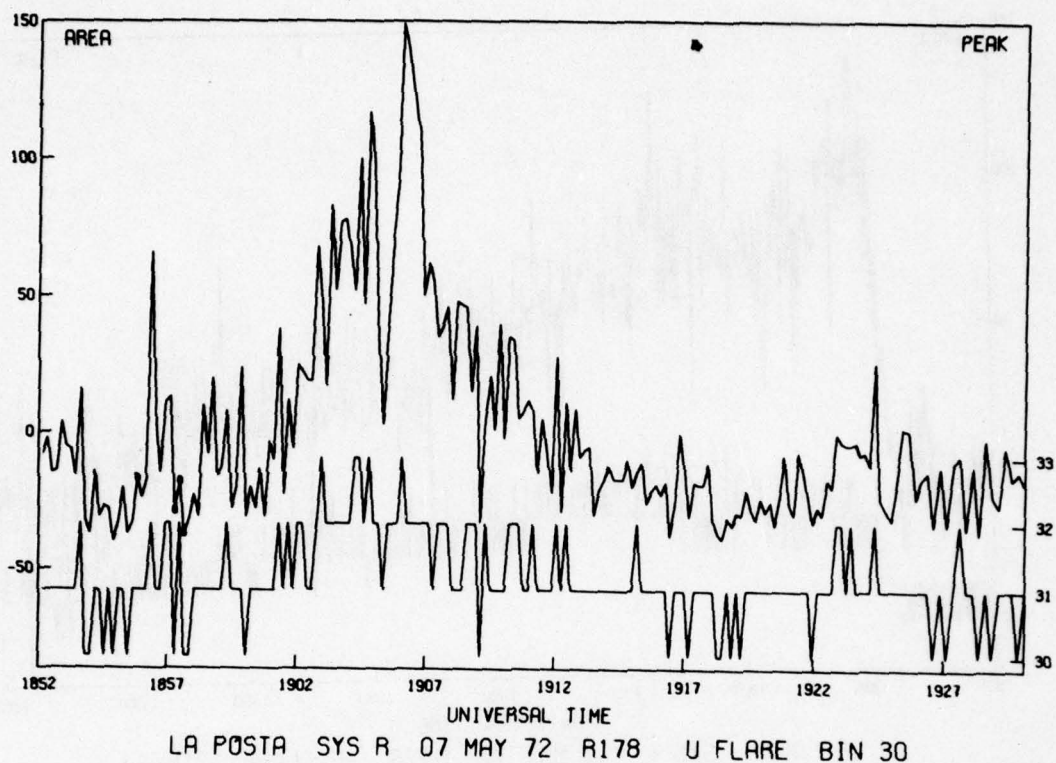


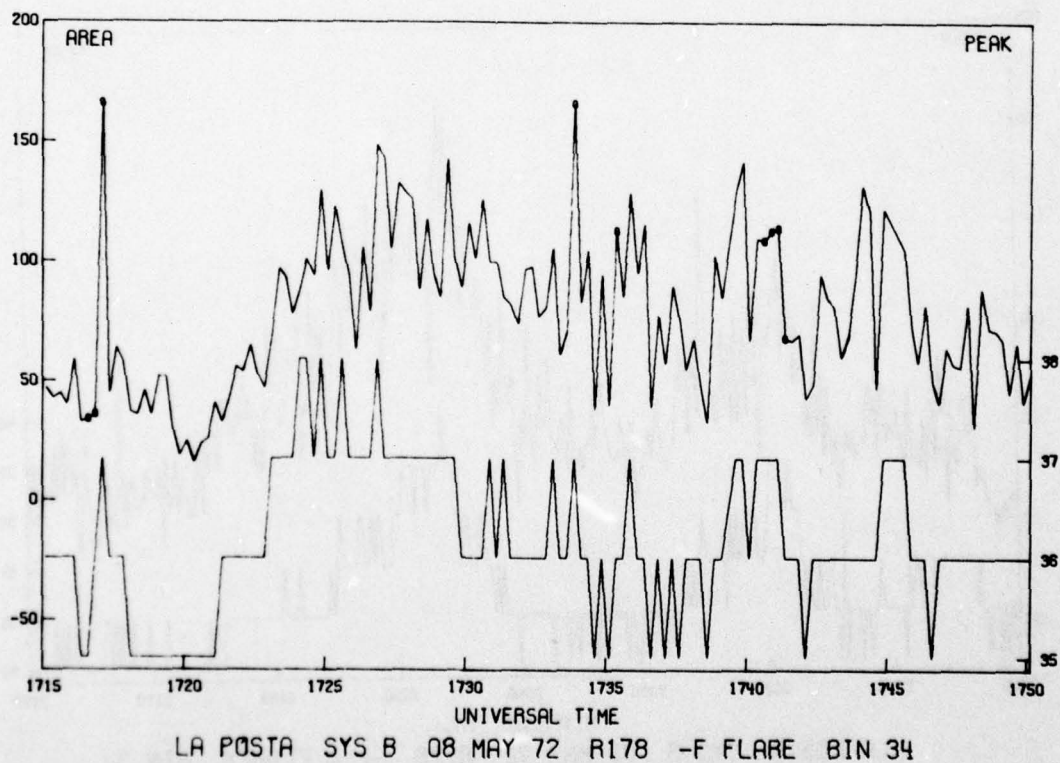
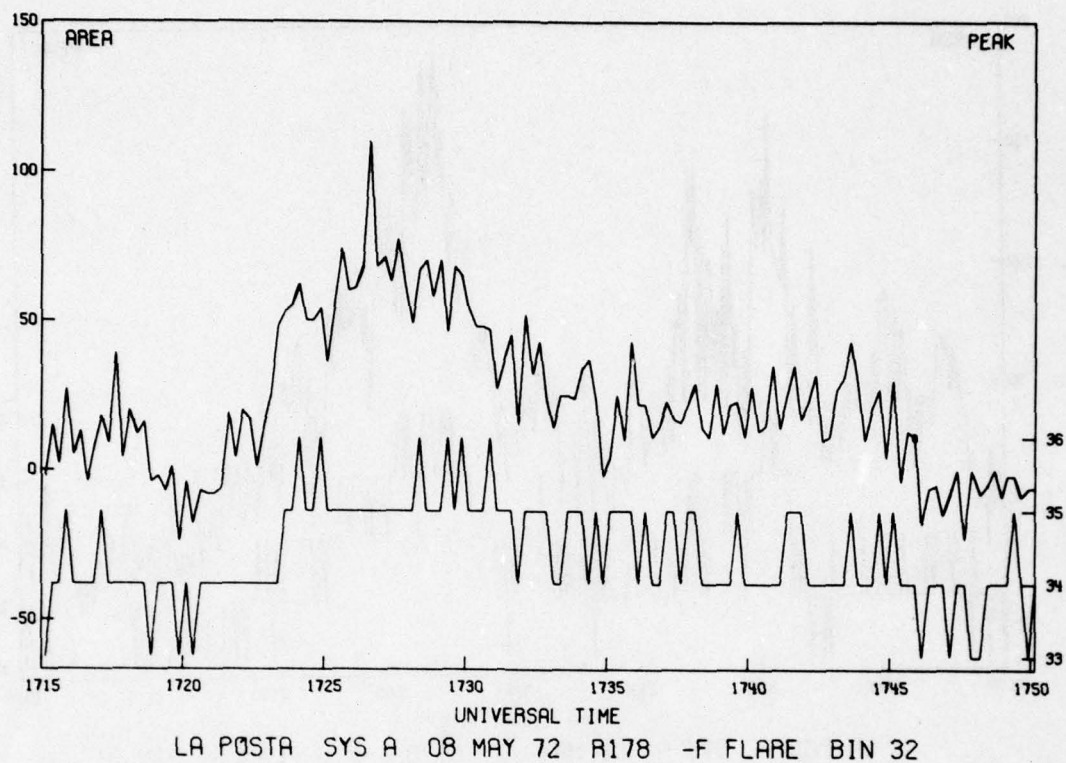


LA POSTA SYS L 07 MAY 72 R176 -F FLARE BIN 34

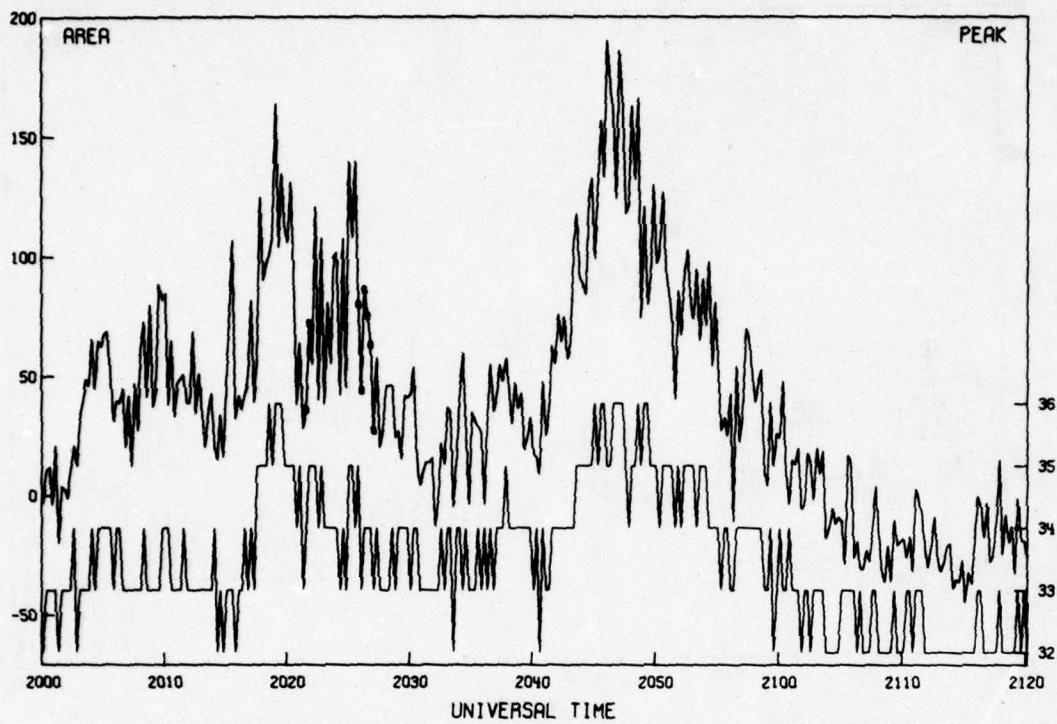


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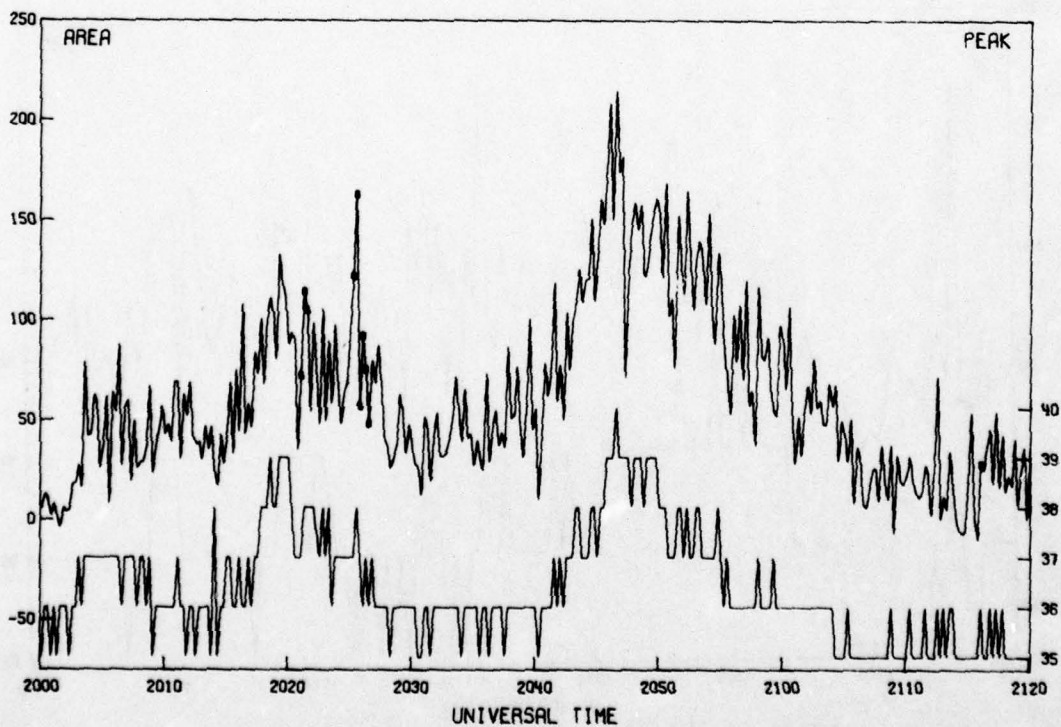




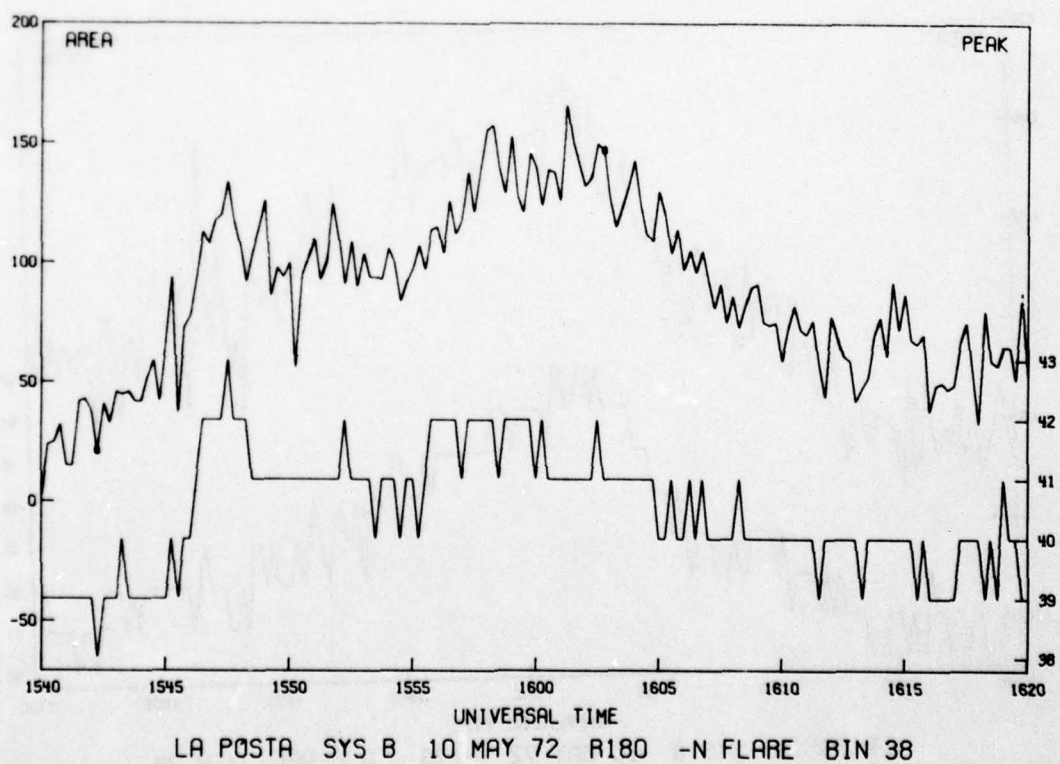
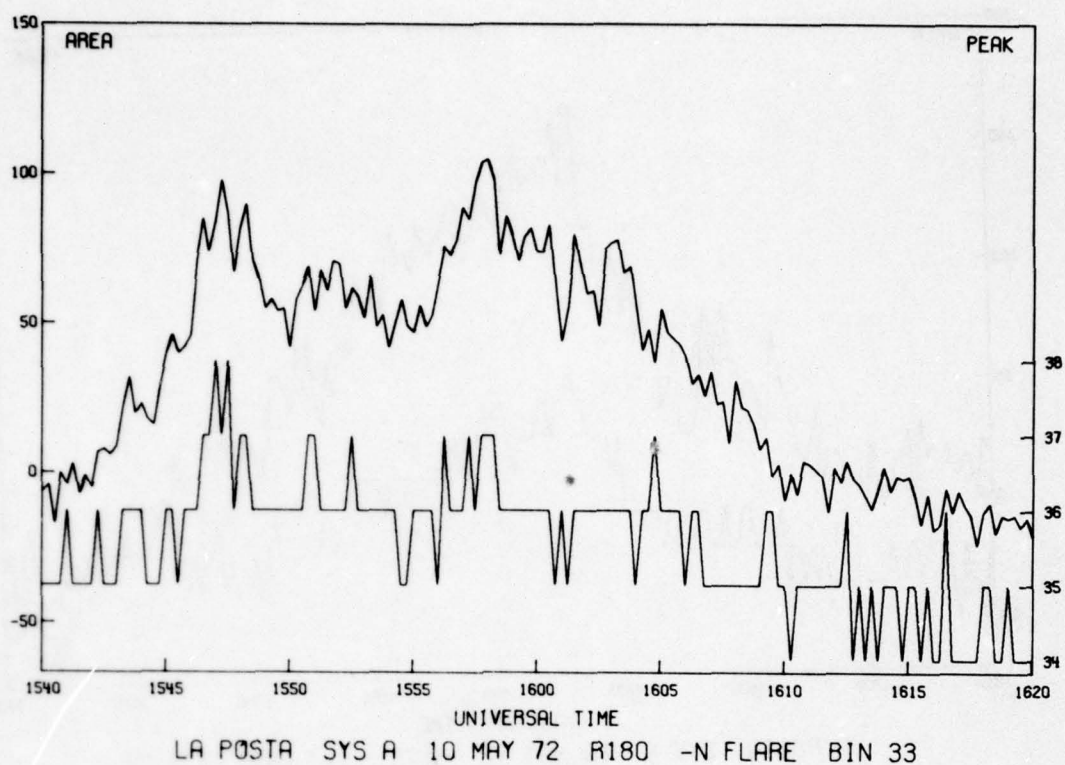


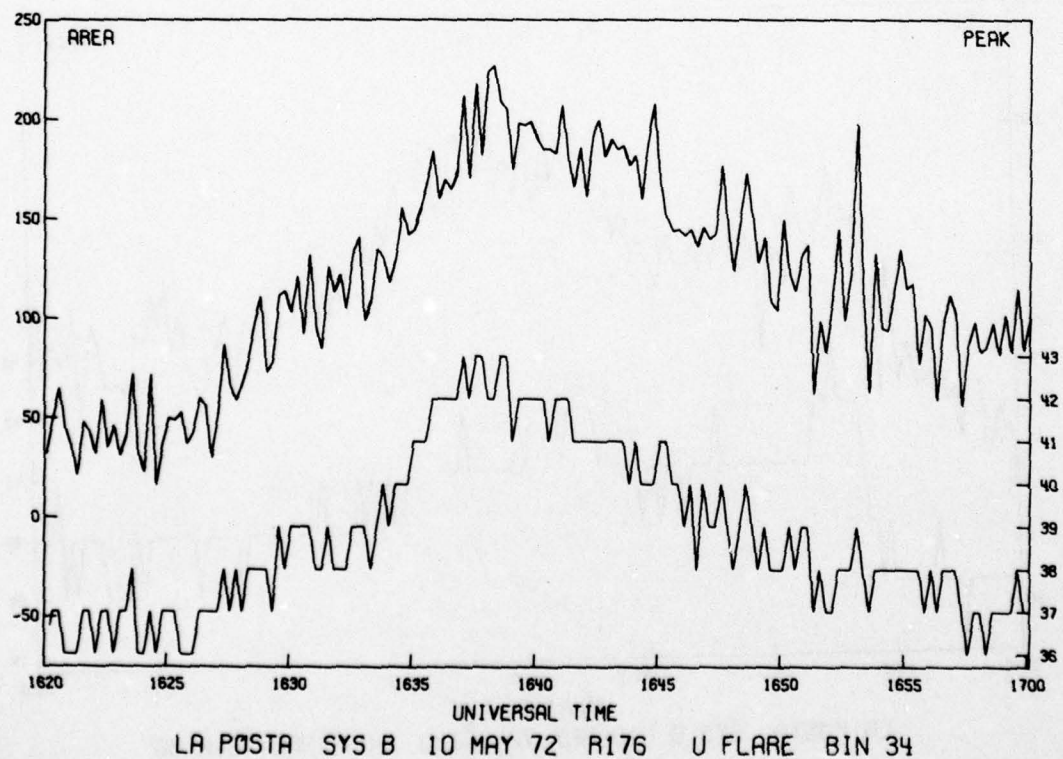
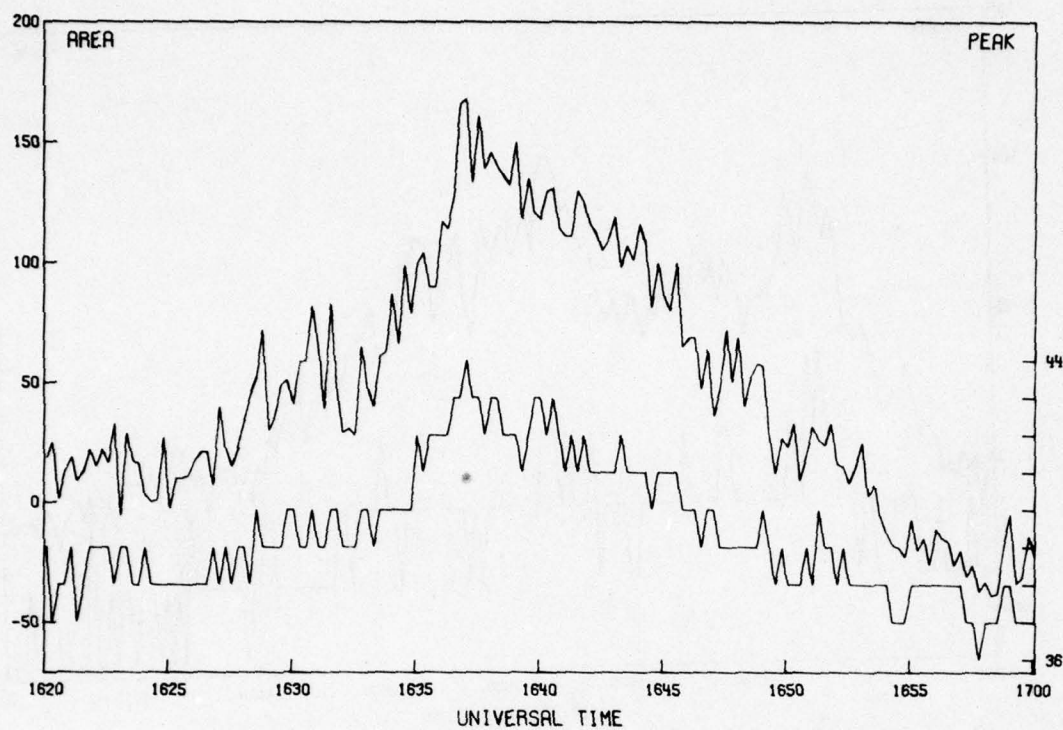


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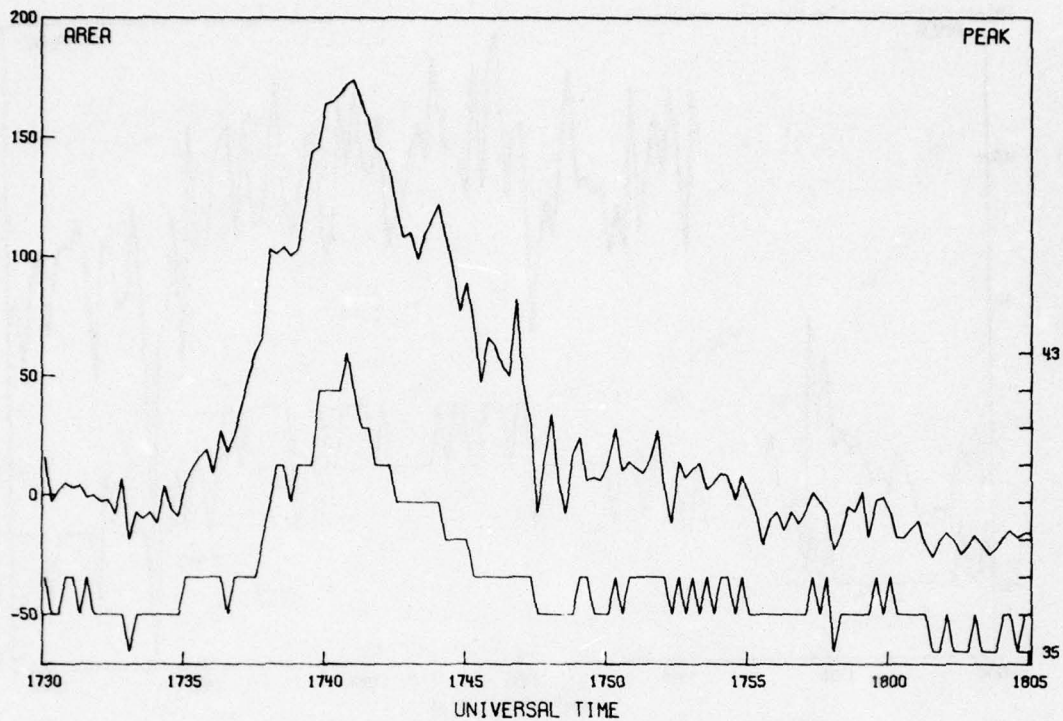


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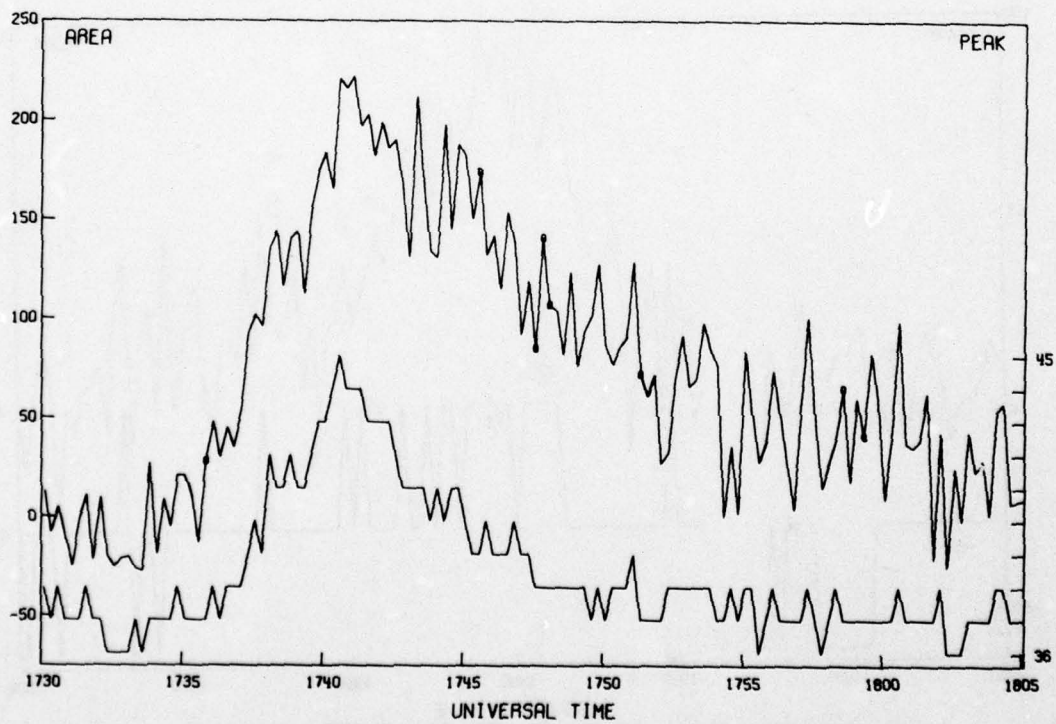




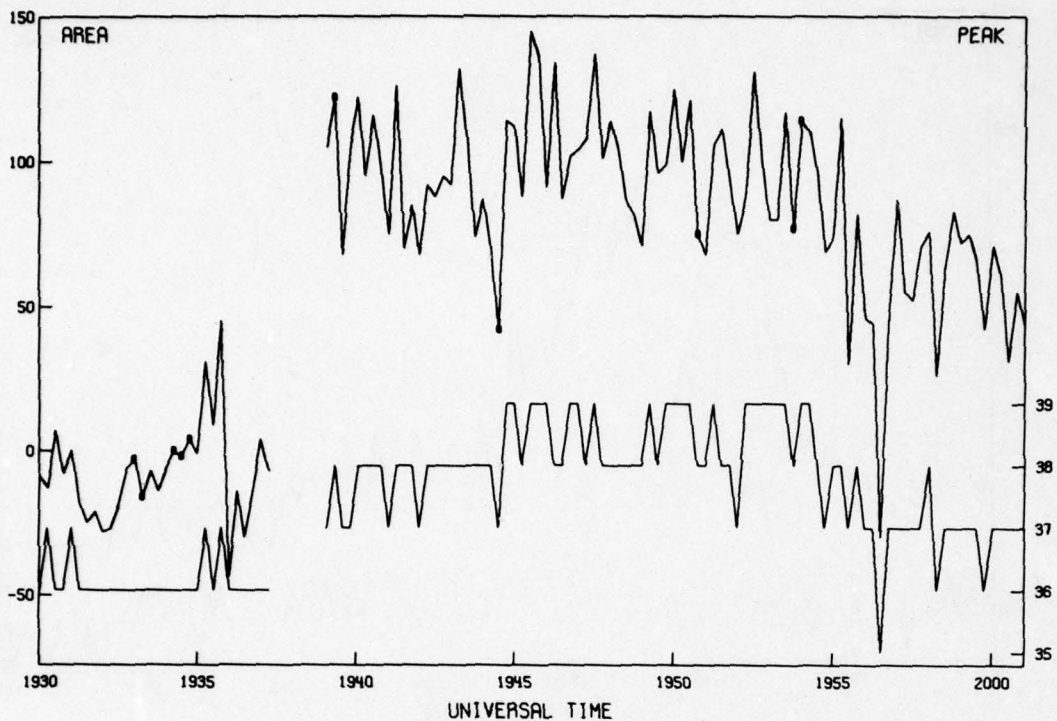




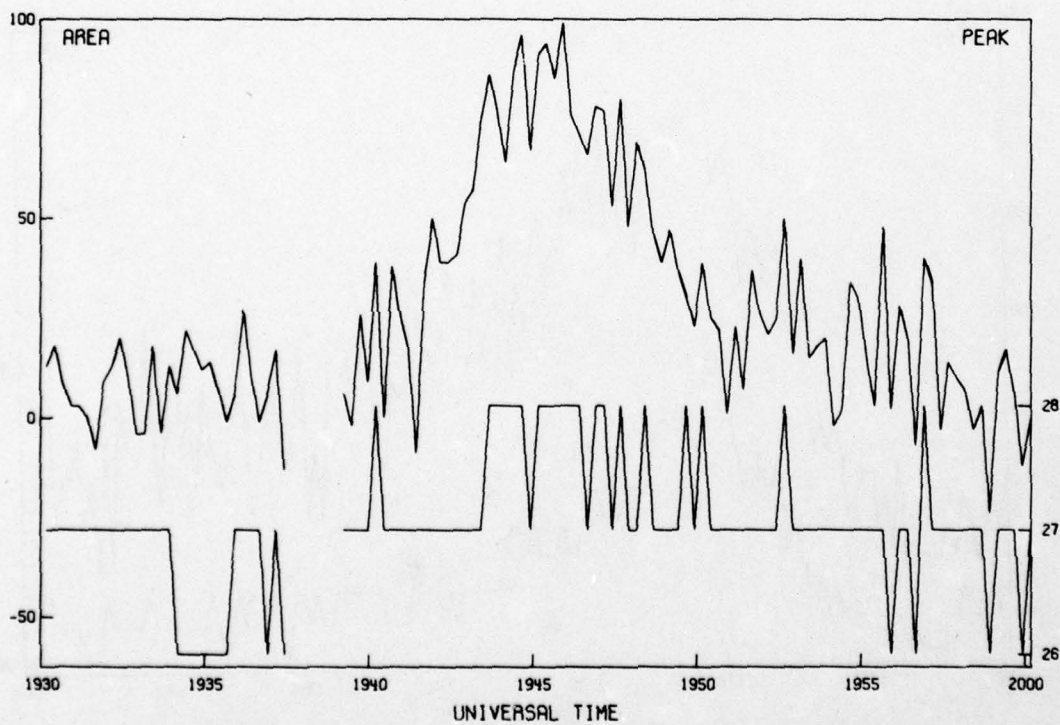
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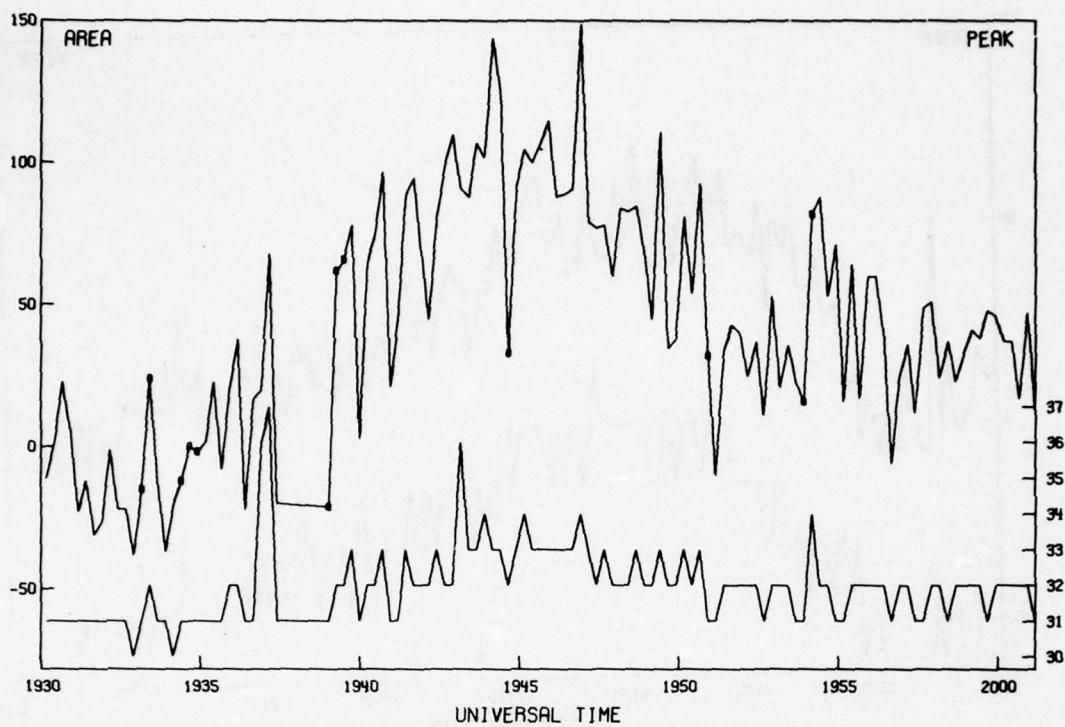
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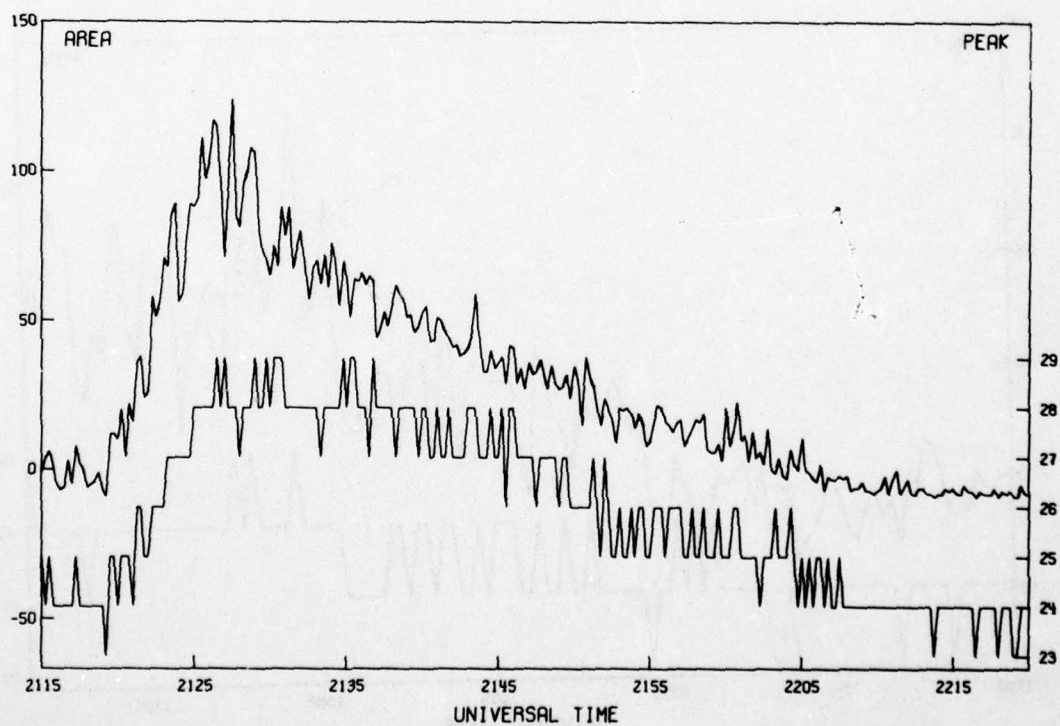
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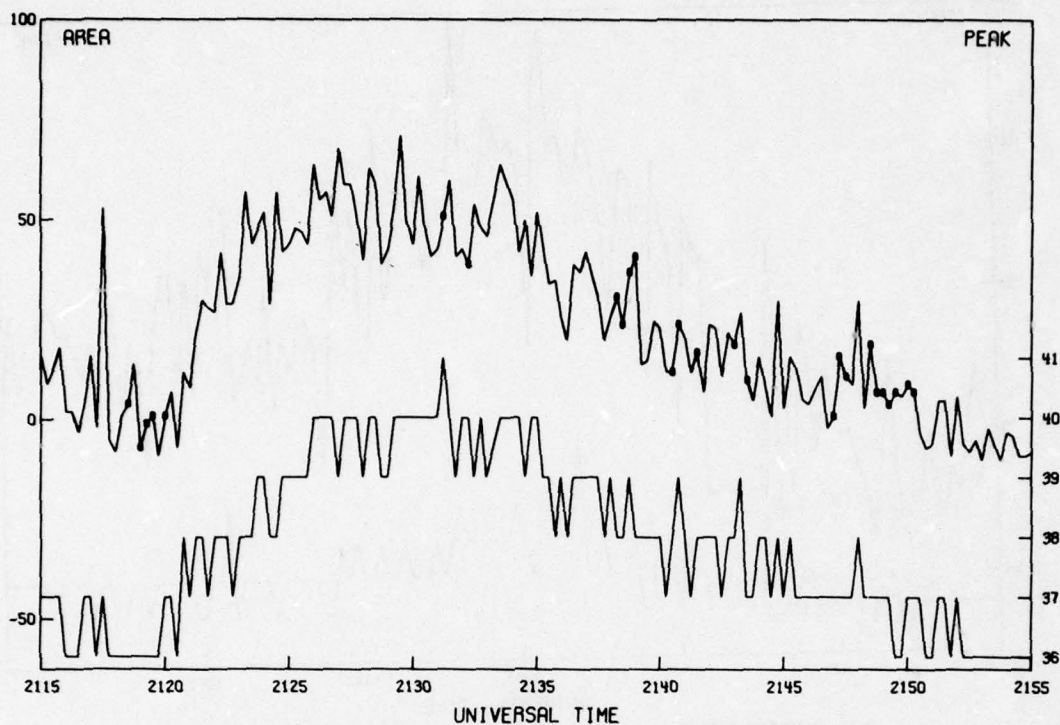


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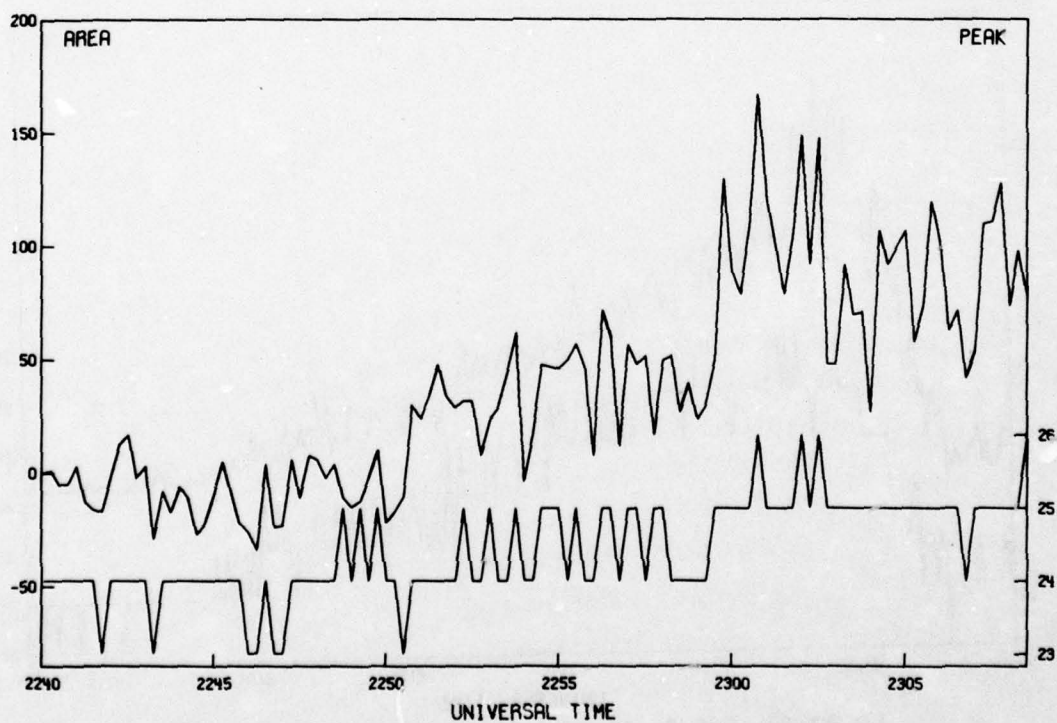


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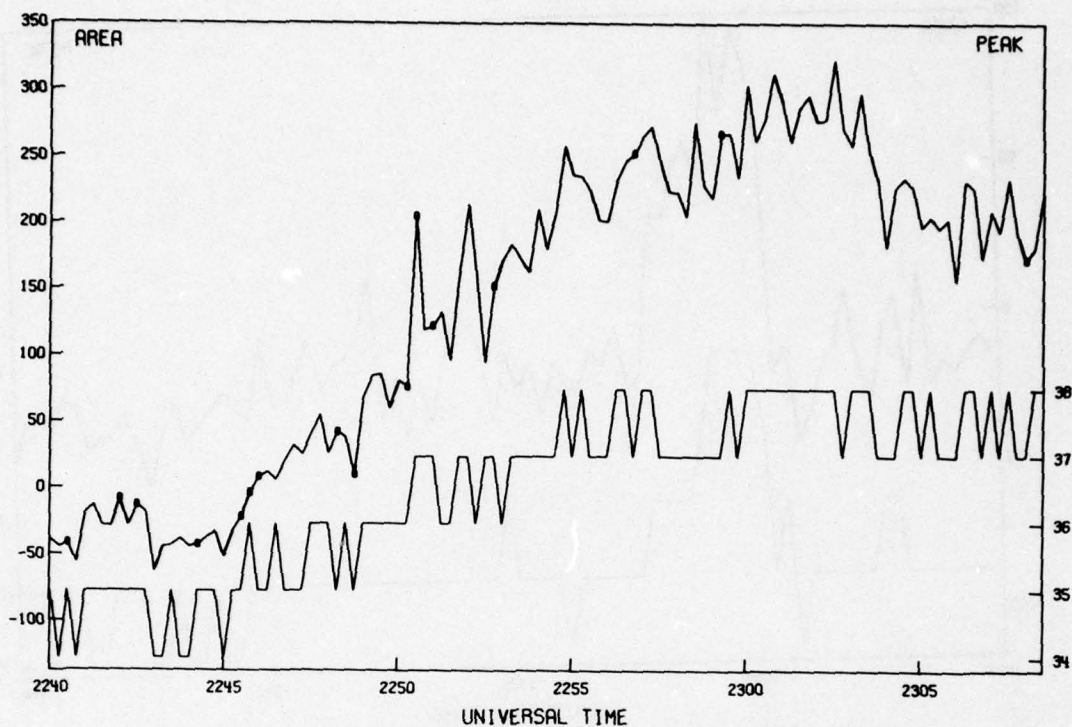




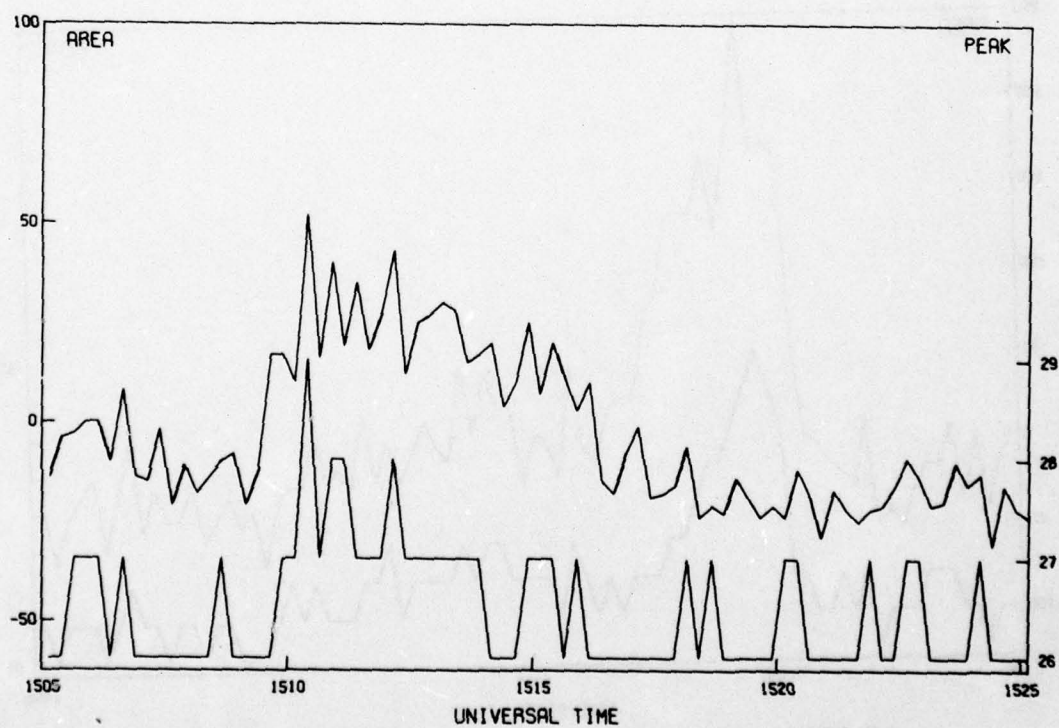
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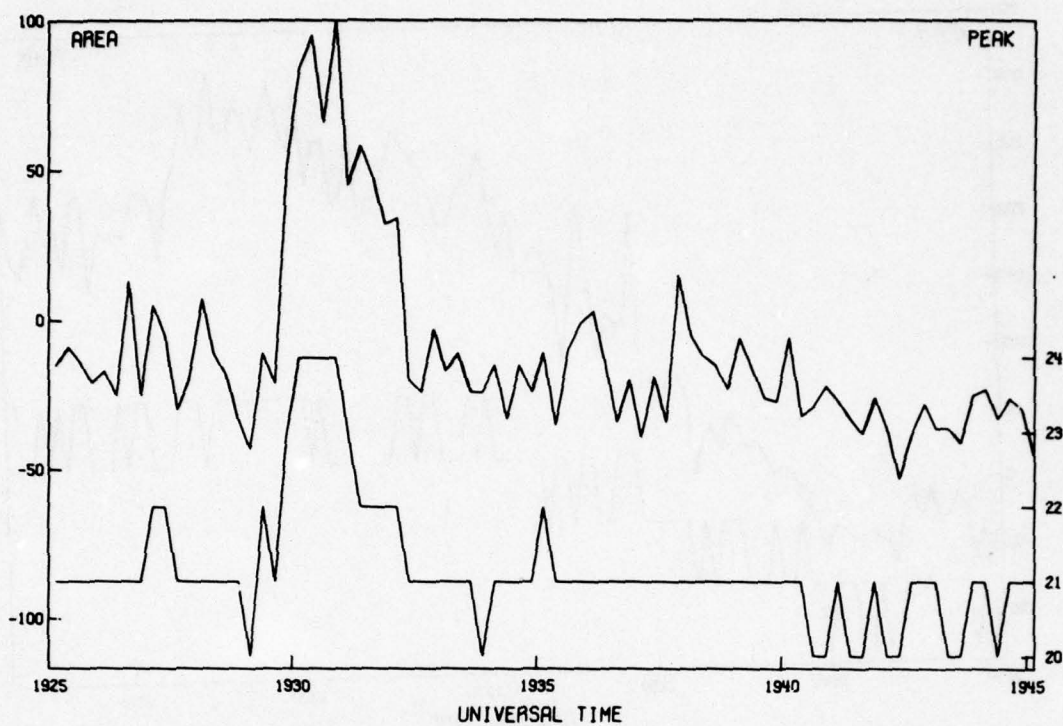
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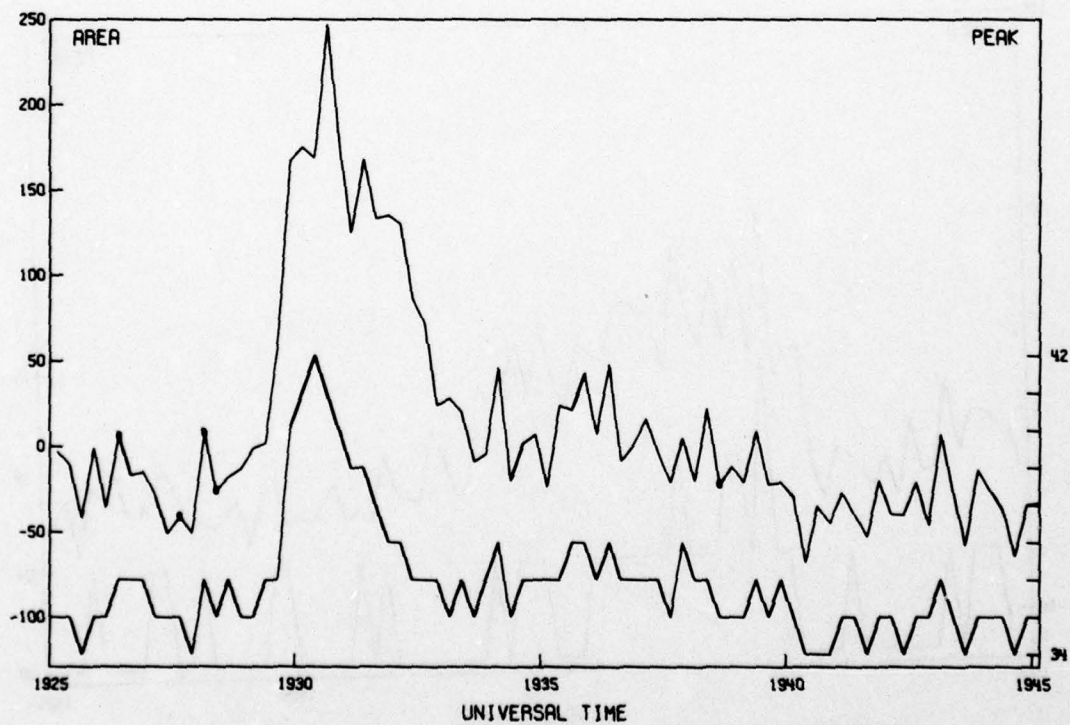
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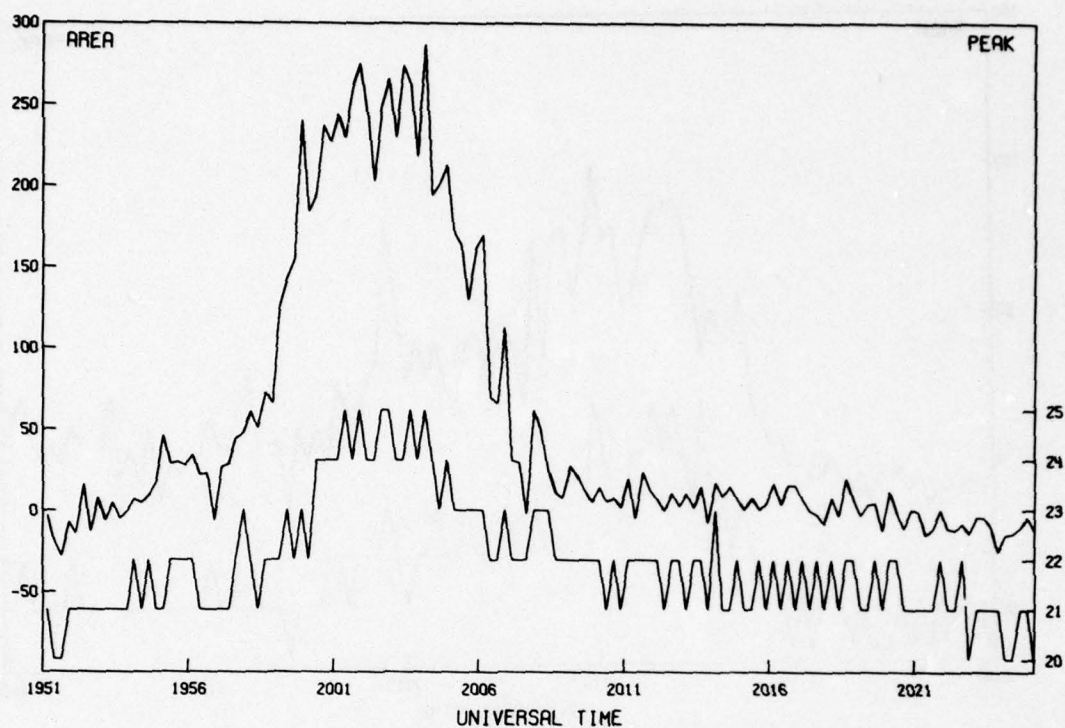


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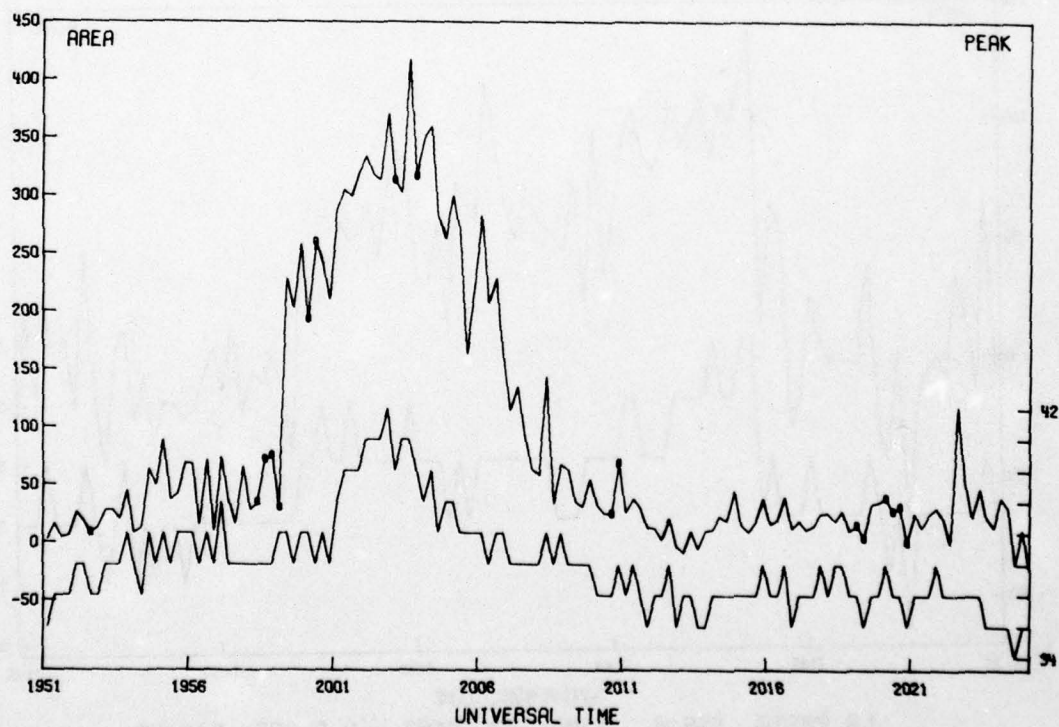


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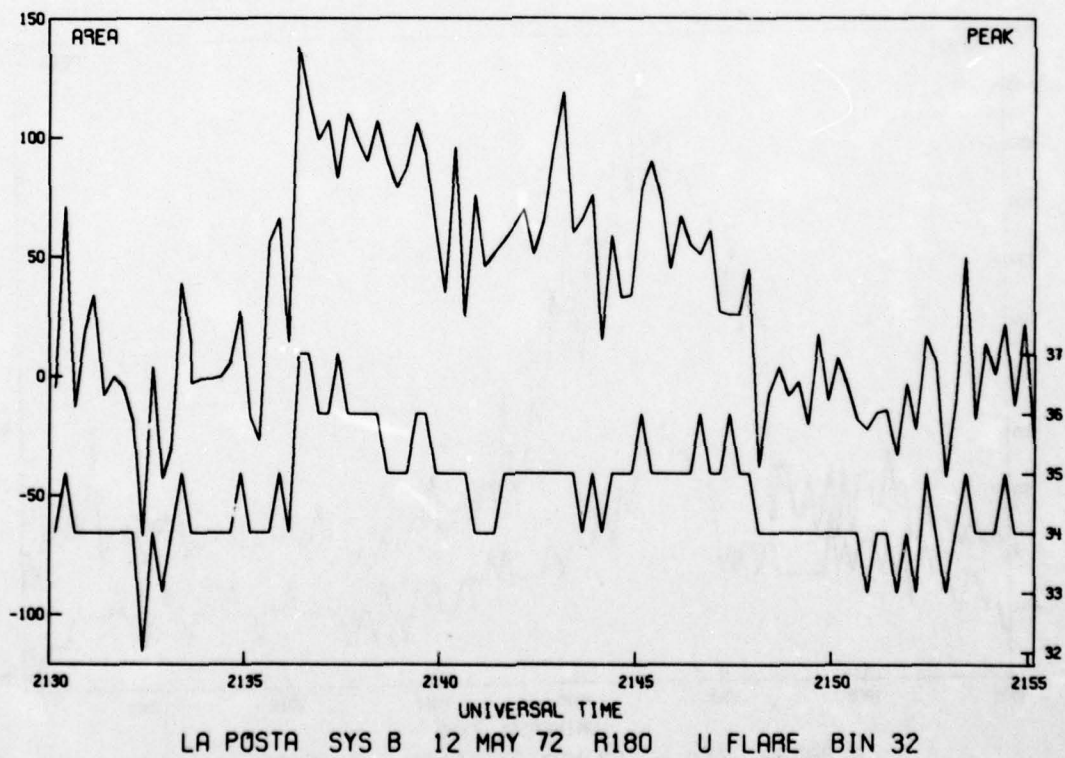
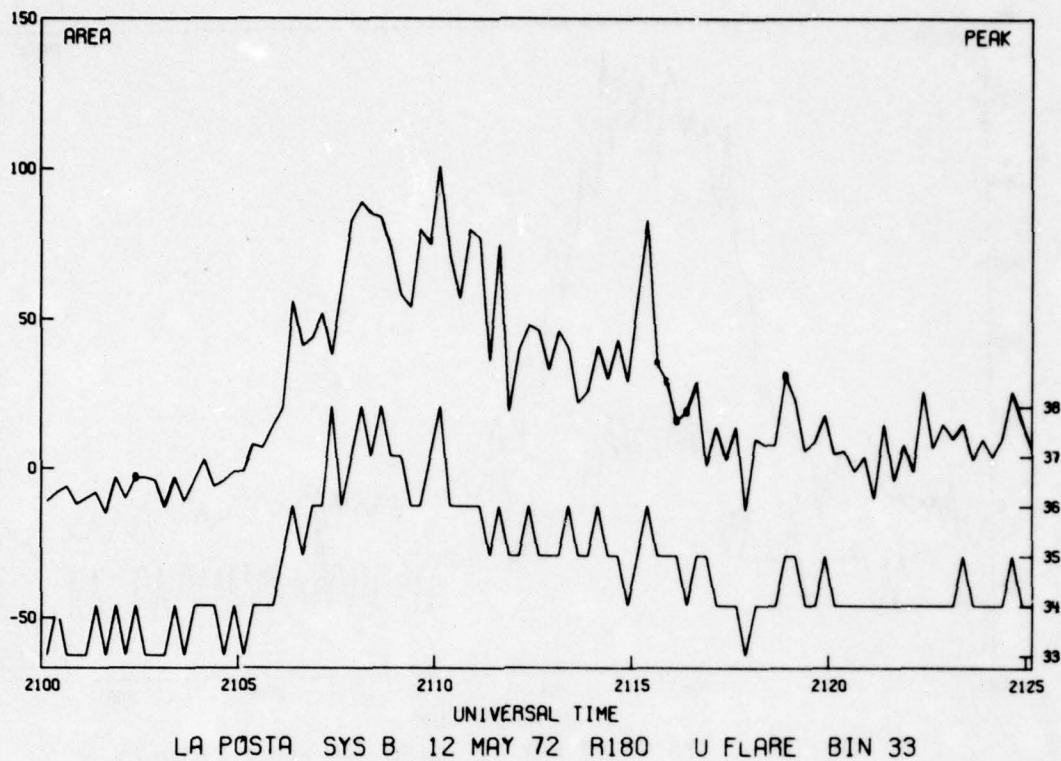


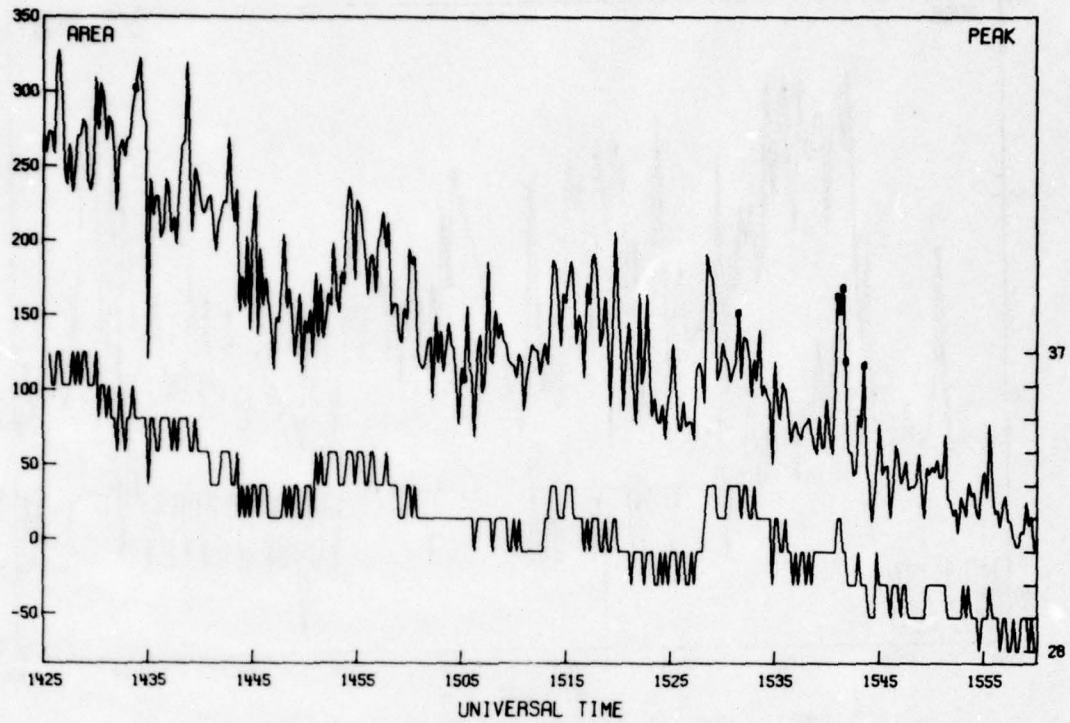


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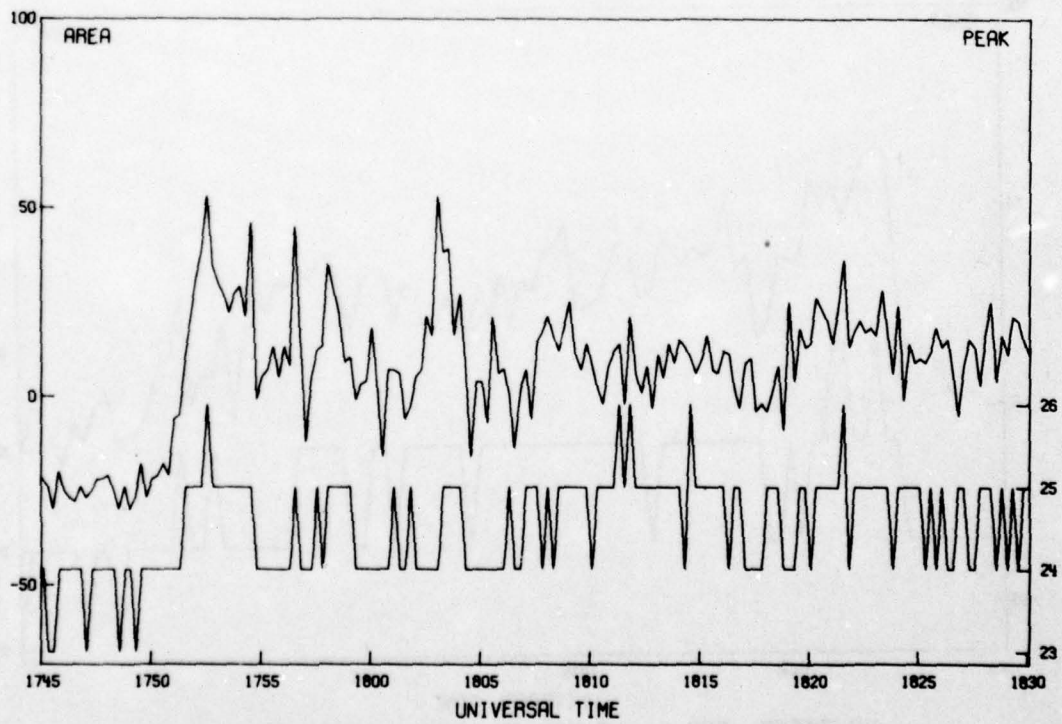


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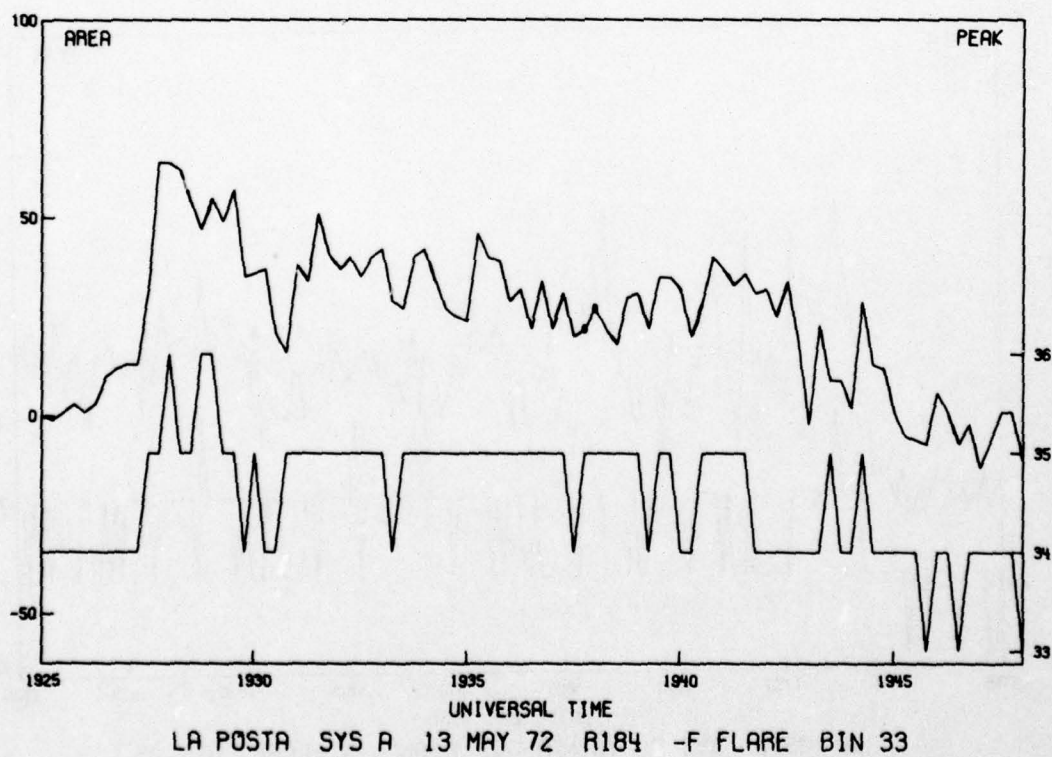
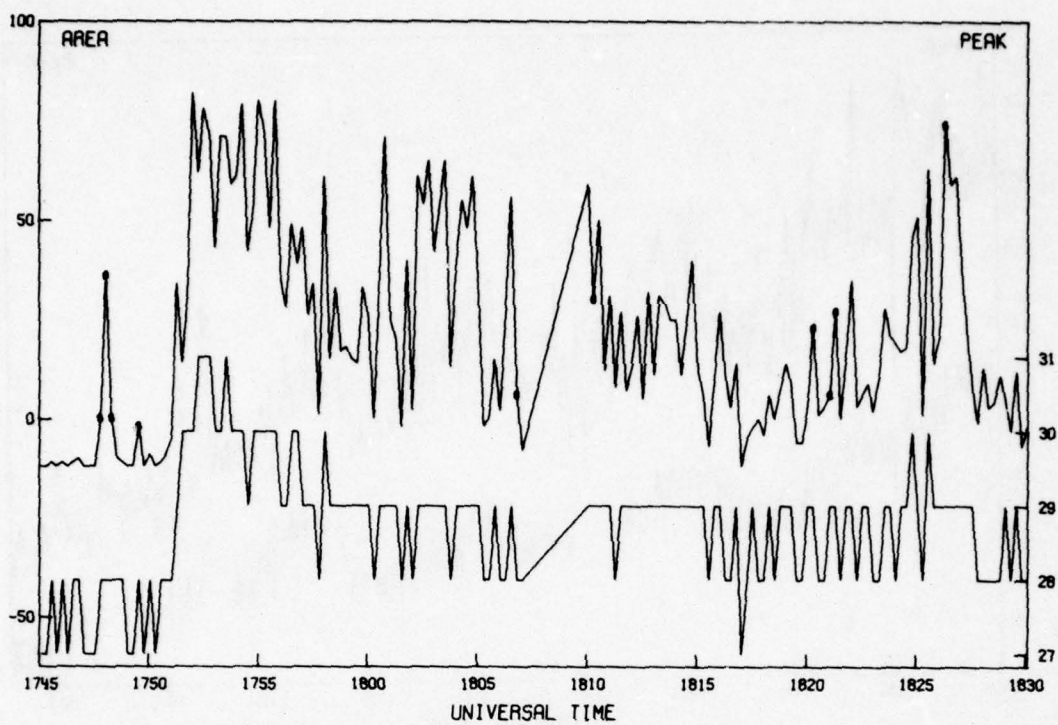


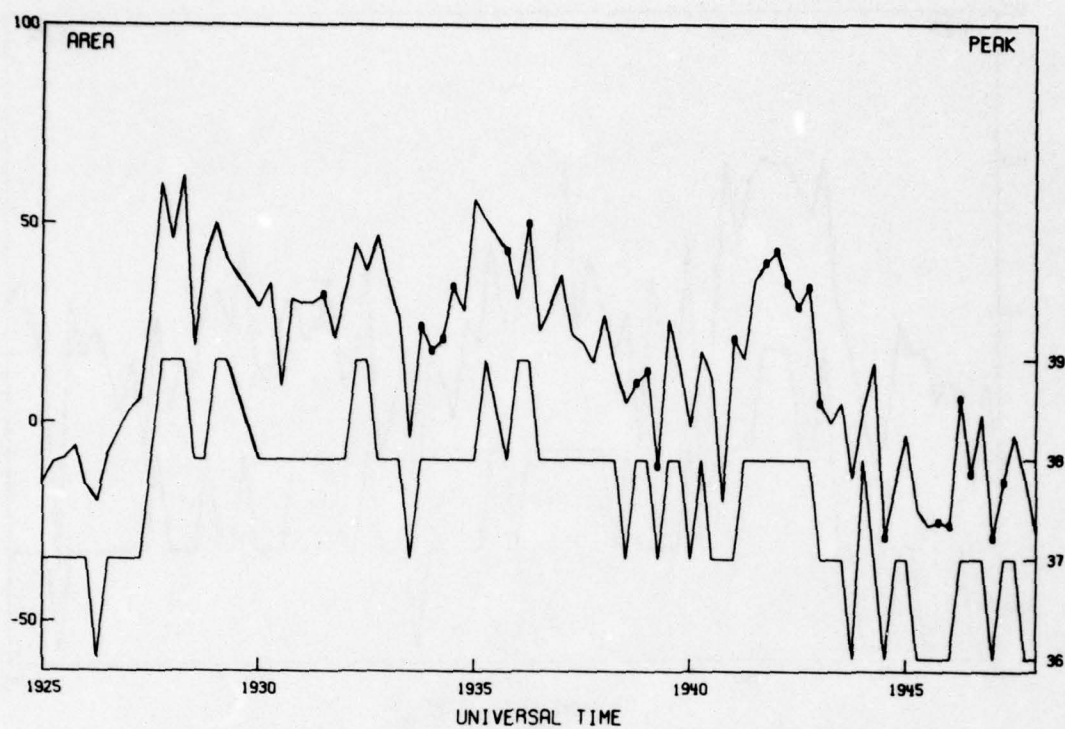
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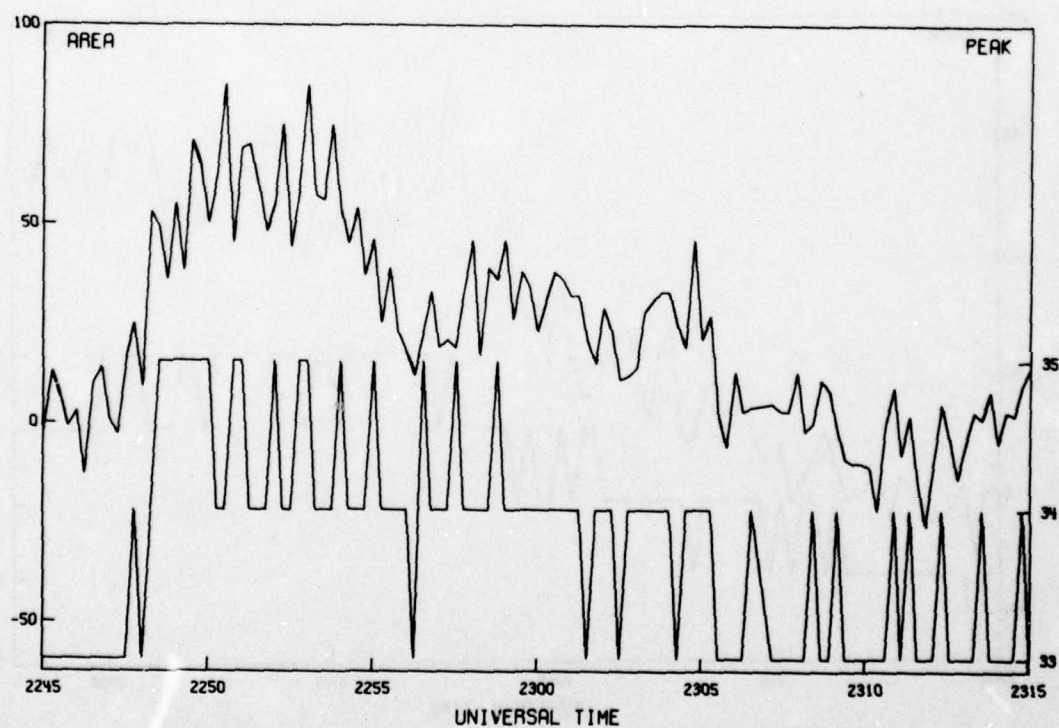
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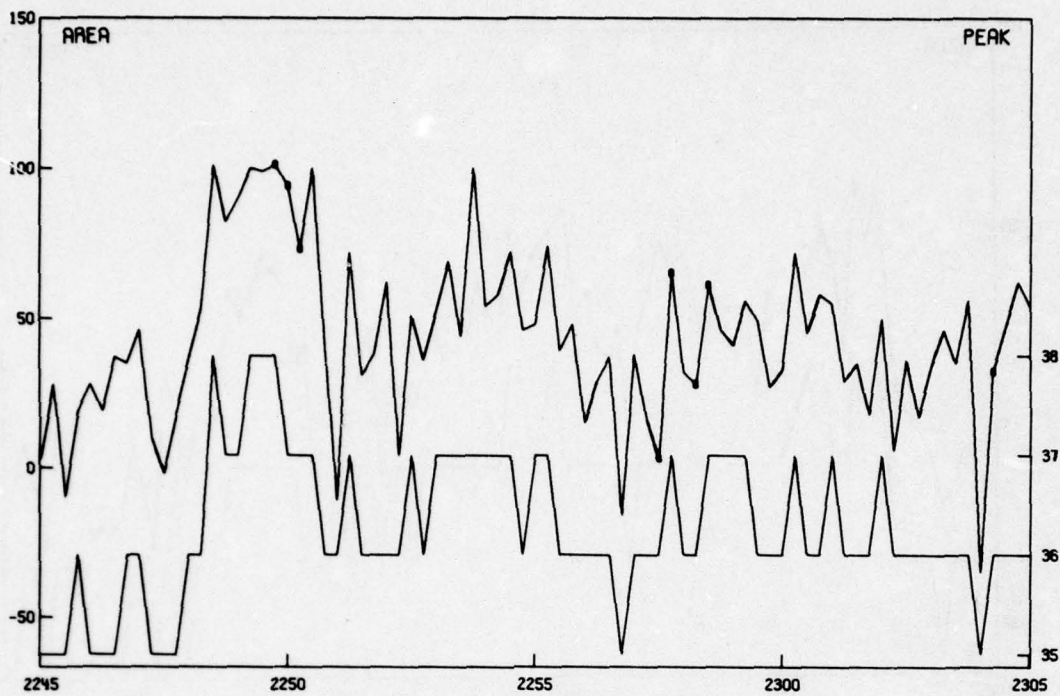




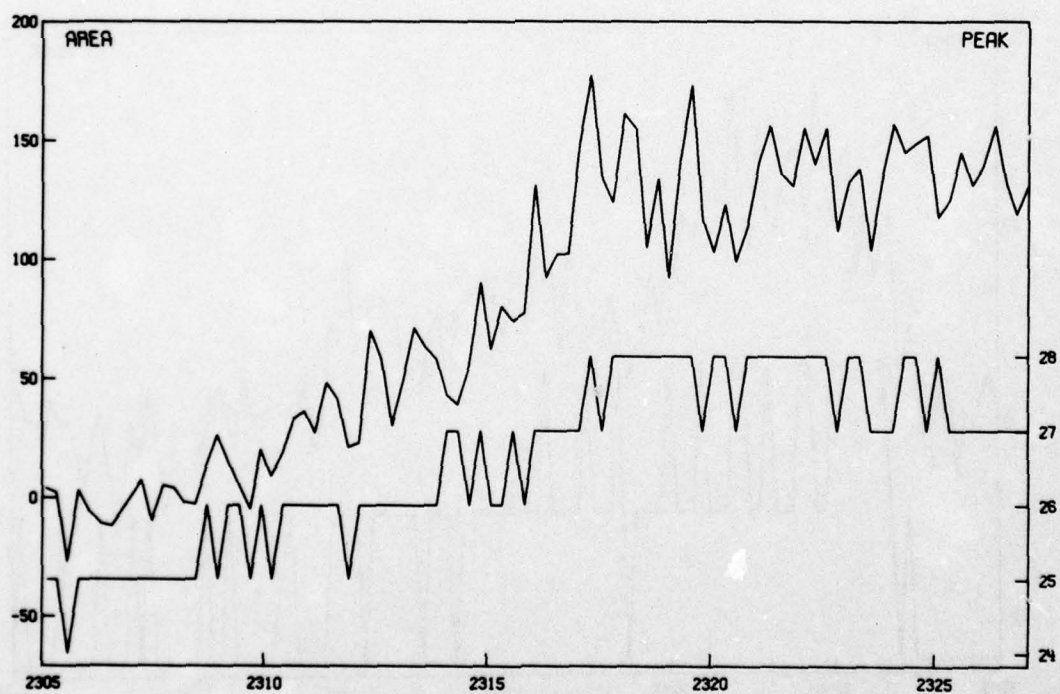
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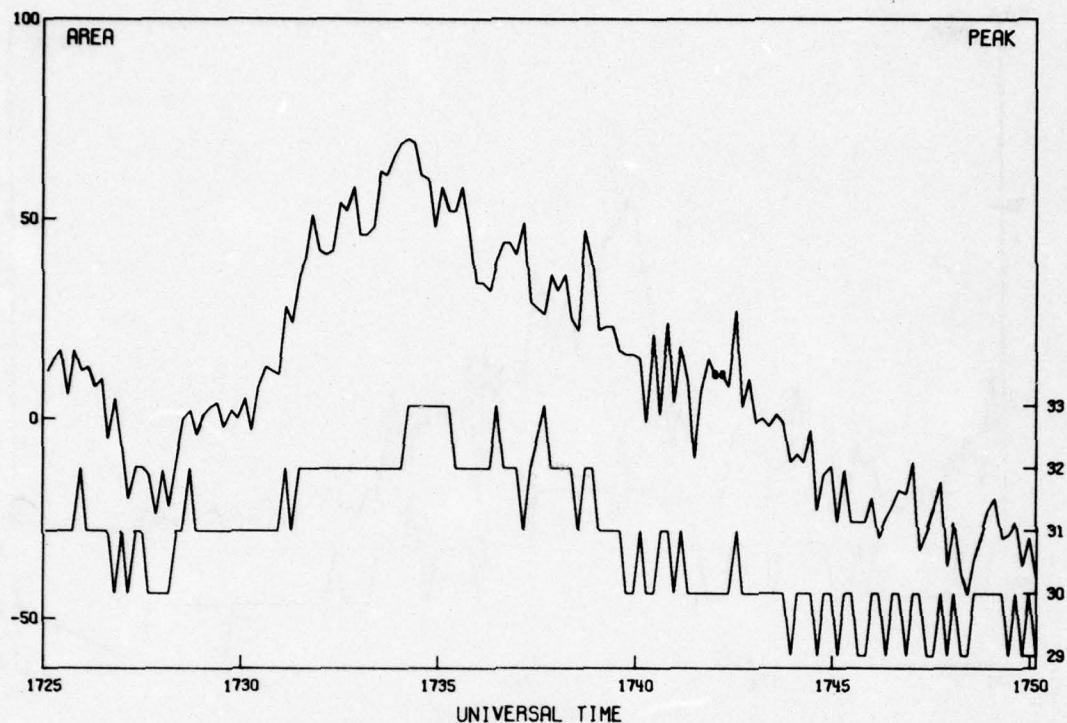


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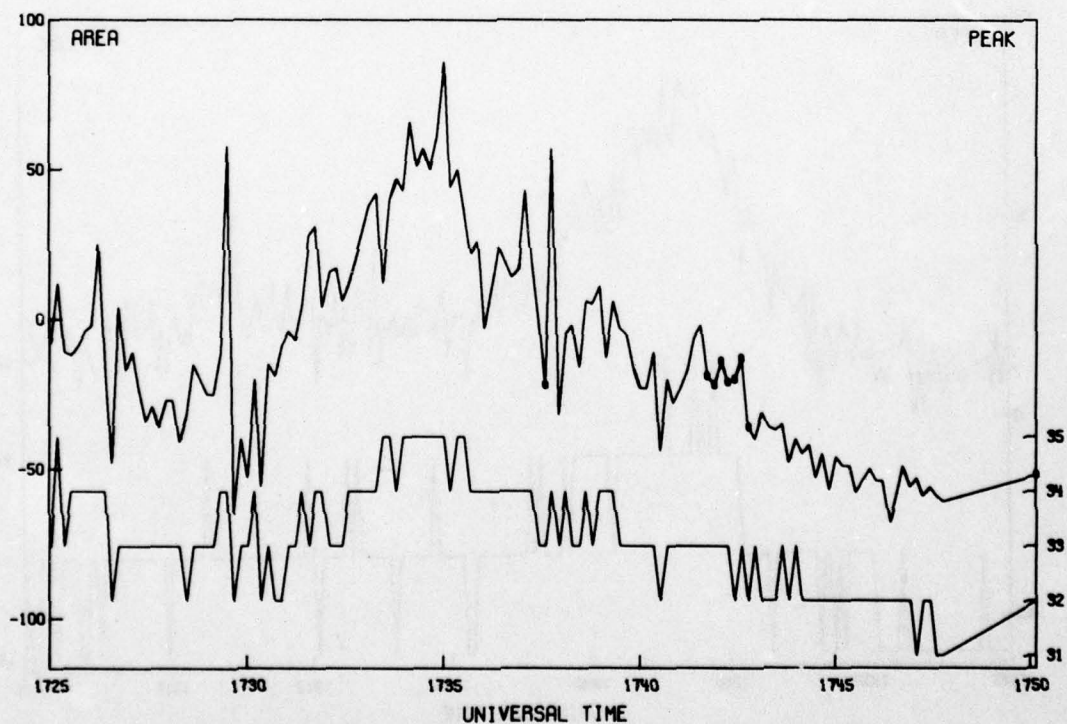


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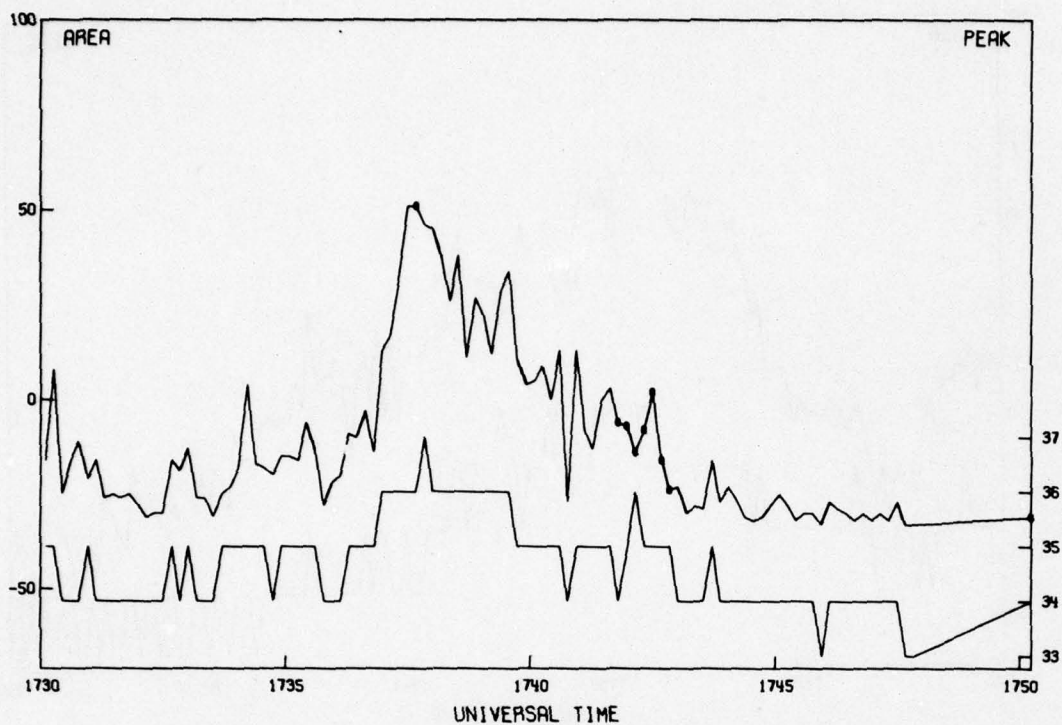




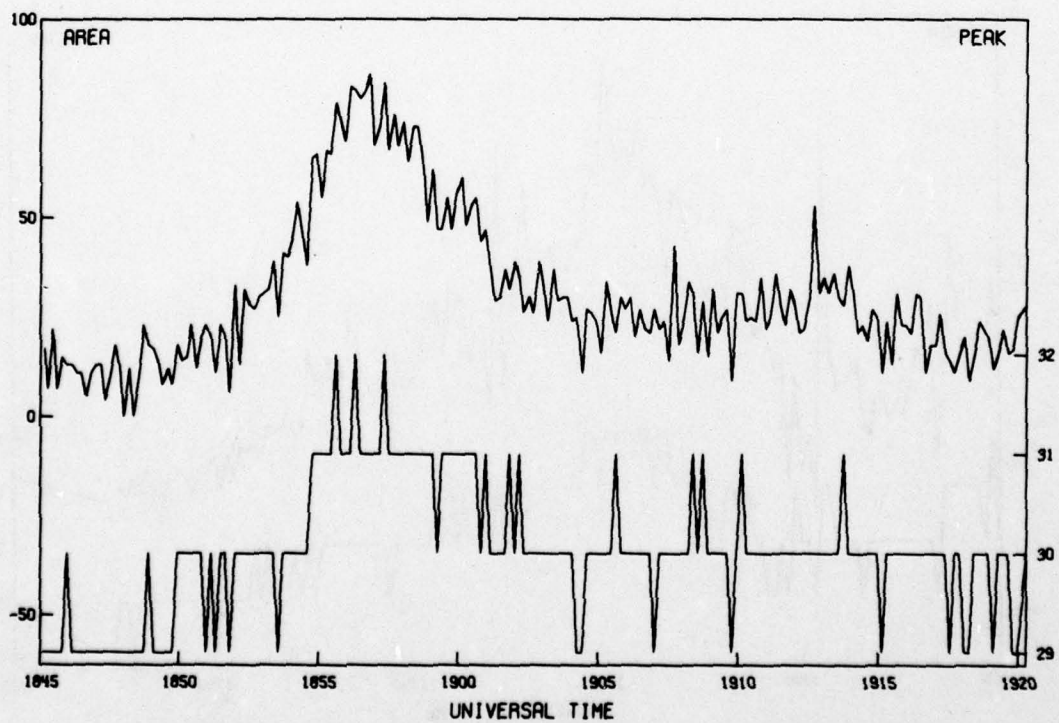
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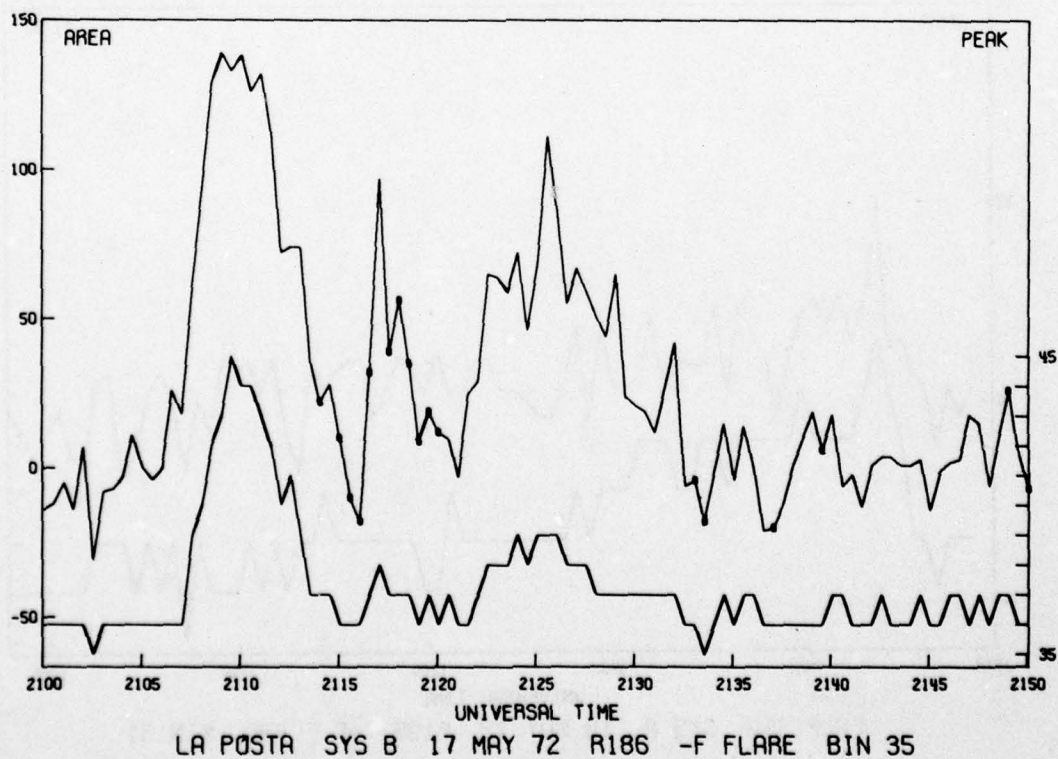
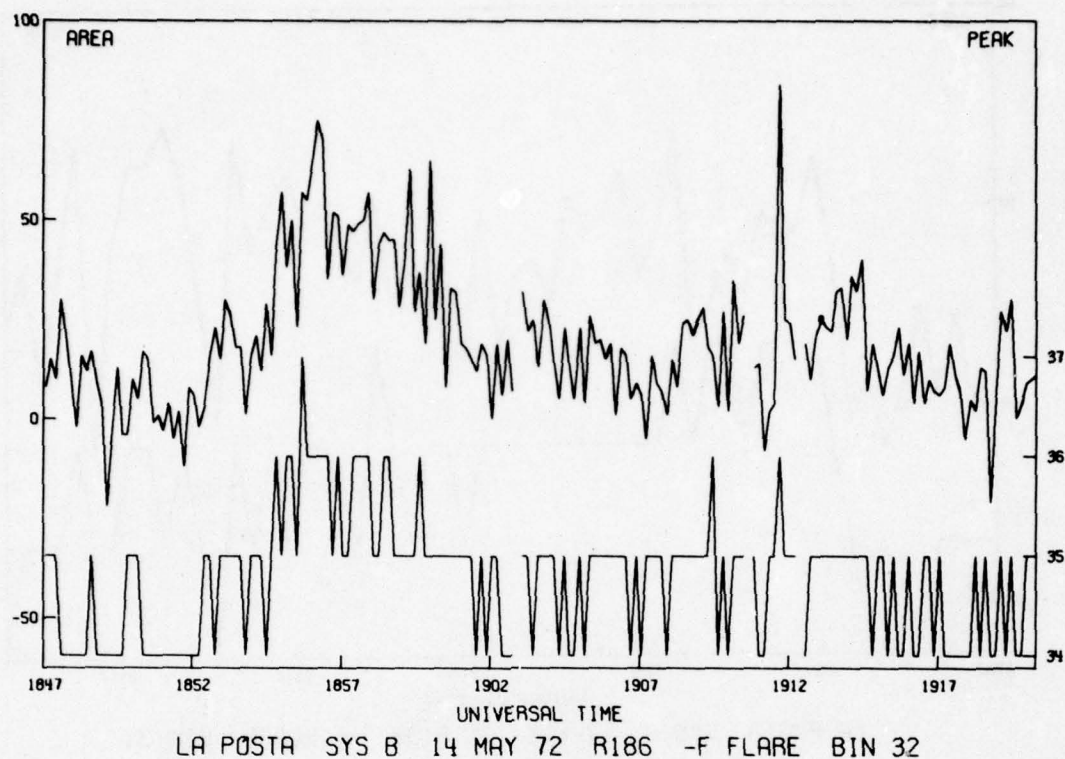
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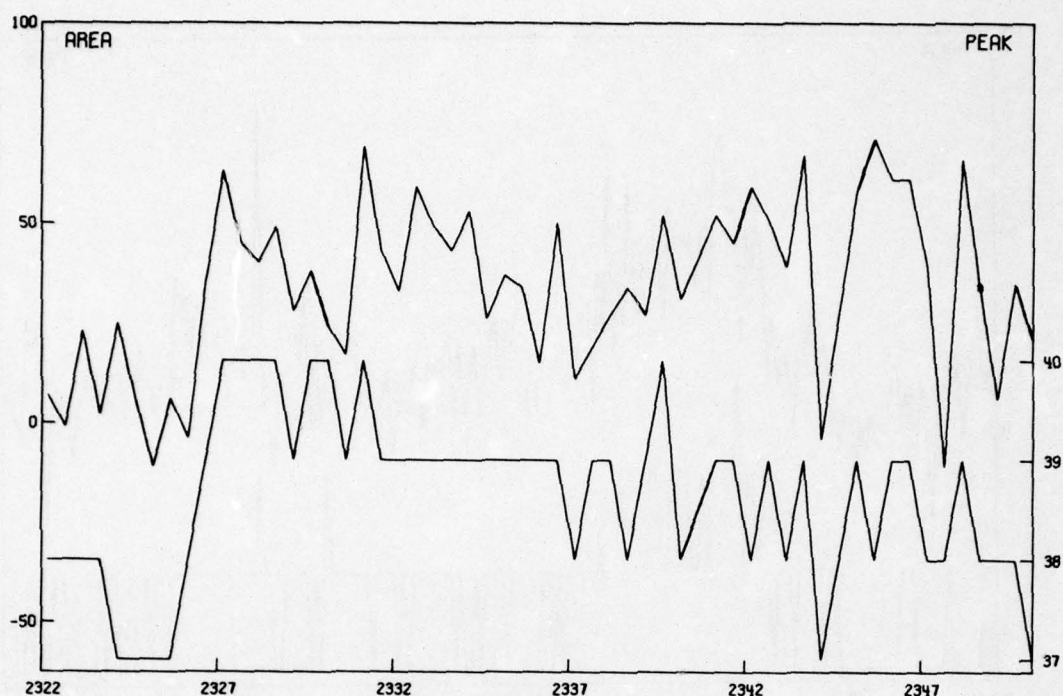
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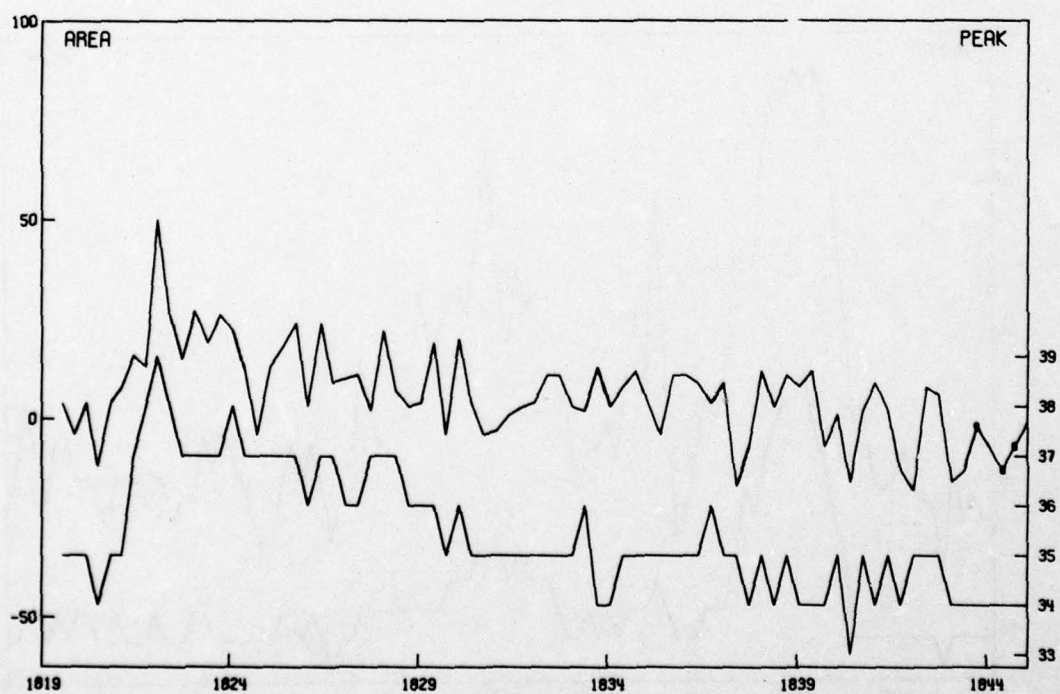
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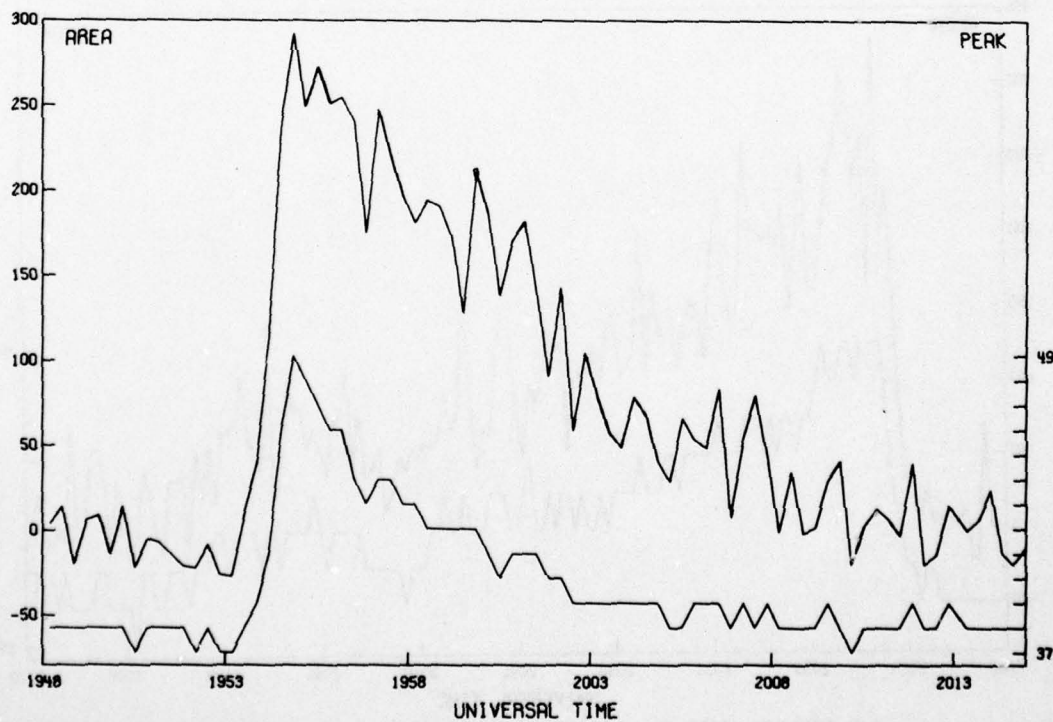
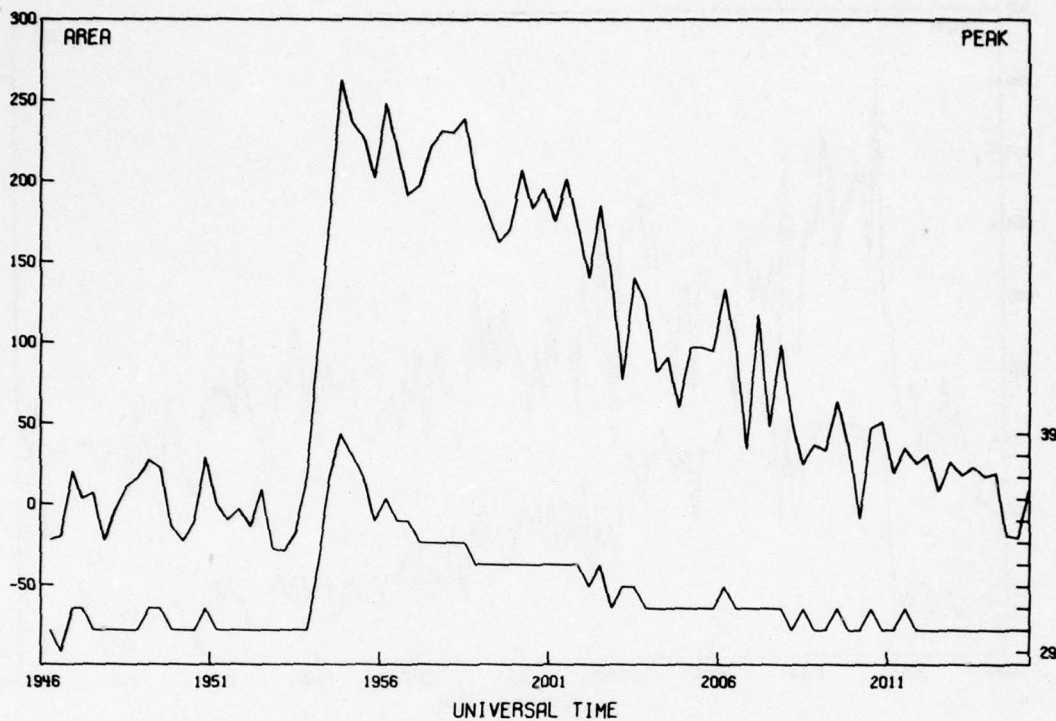


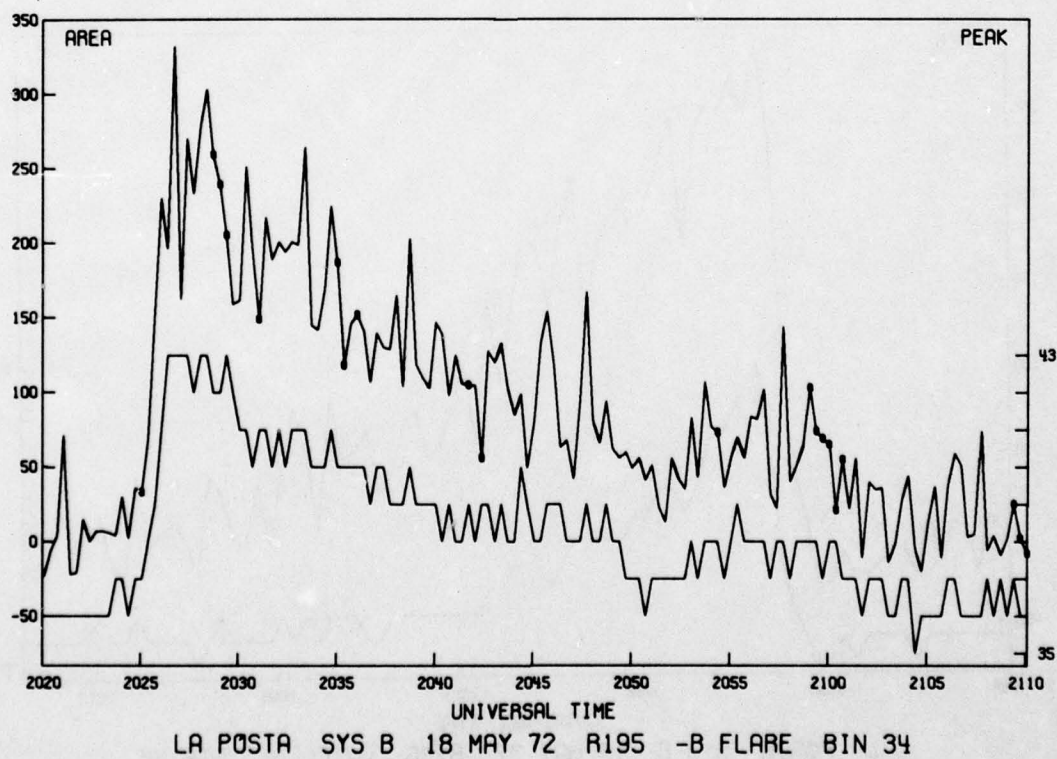
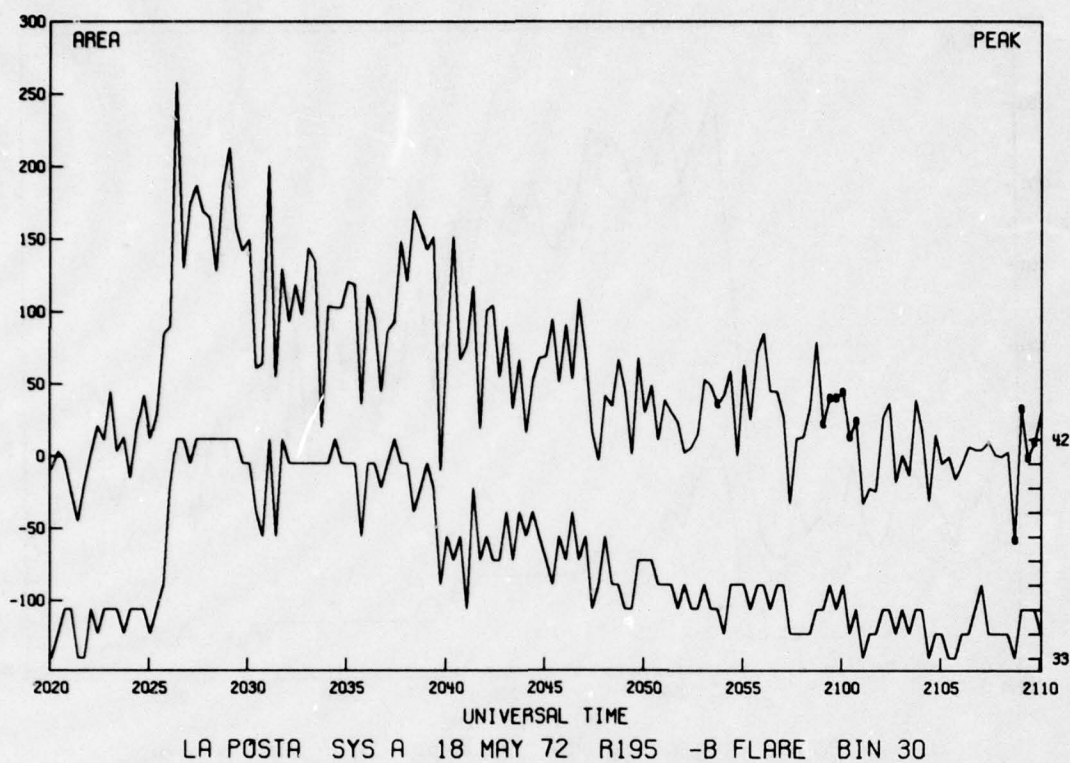


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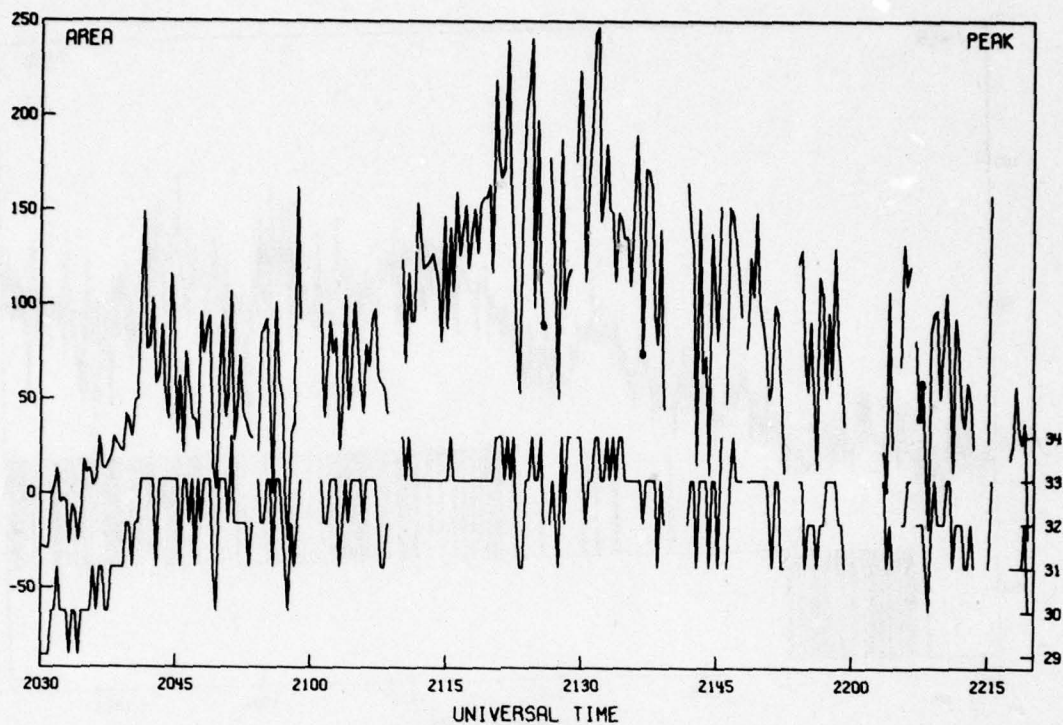


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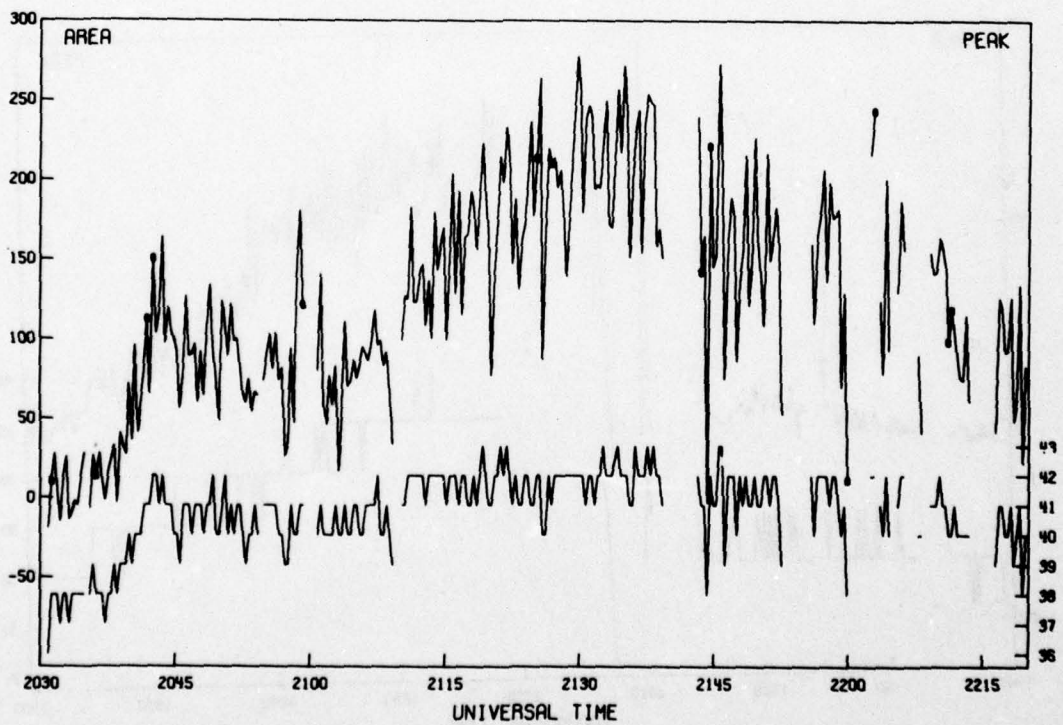




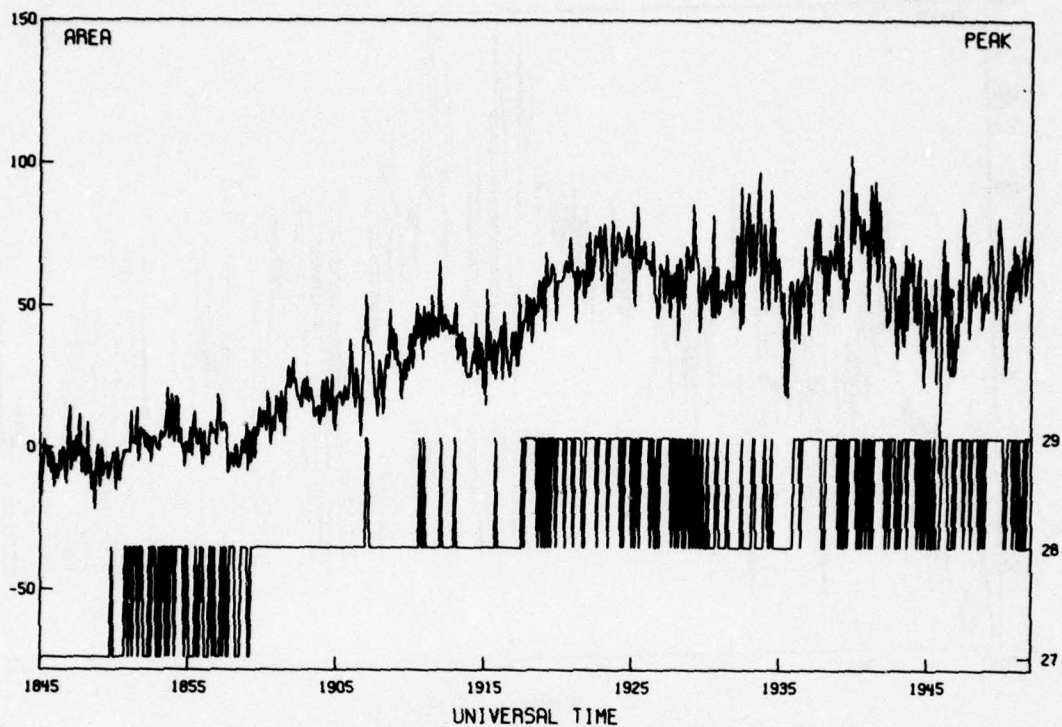




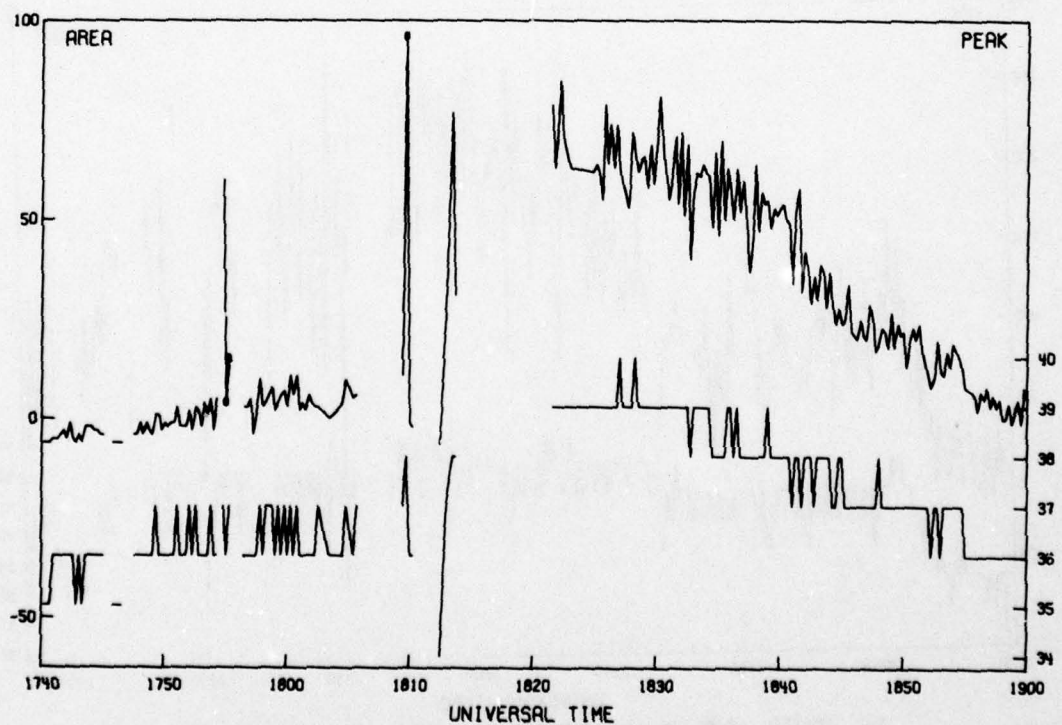
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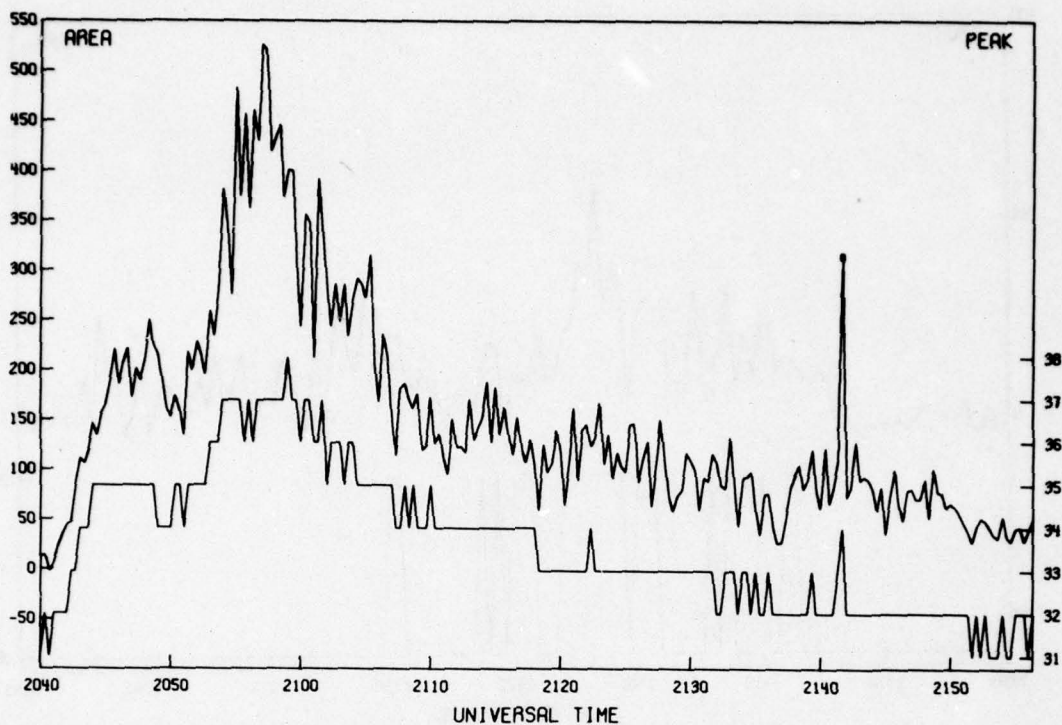
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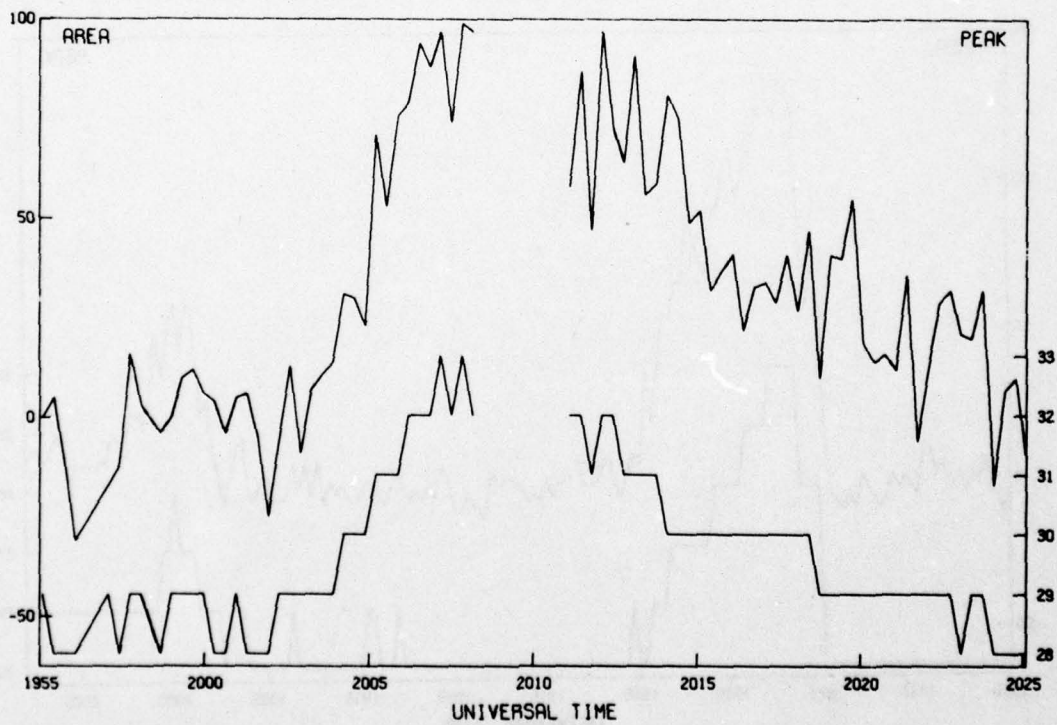
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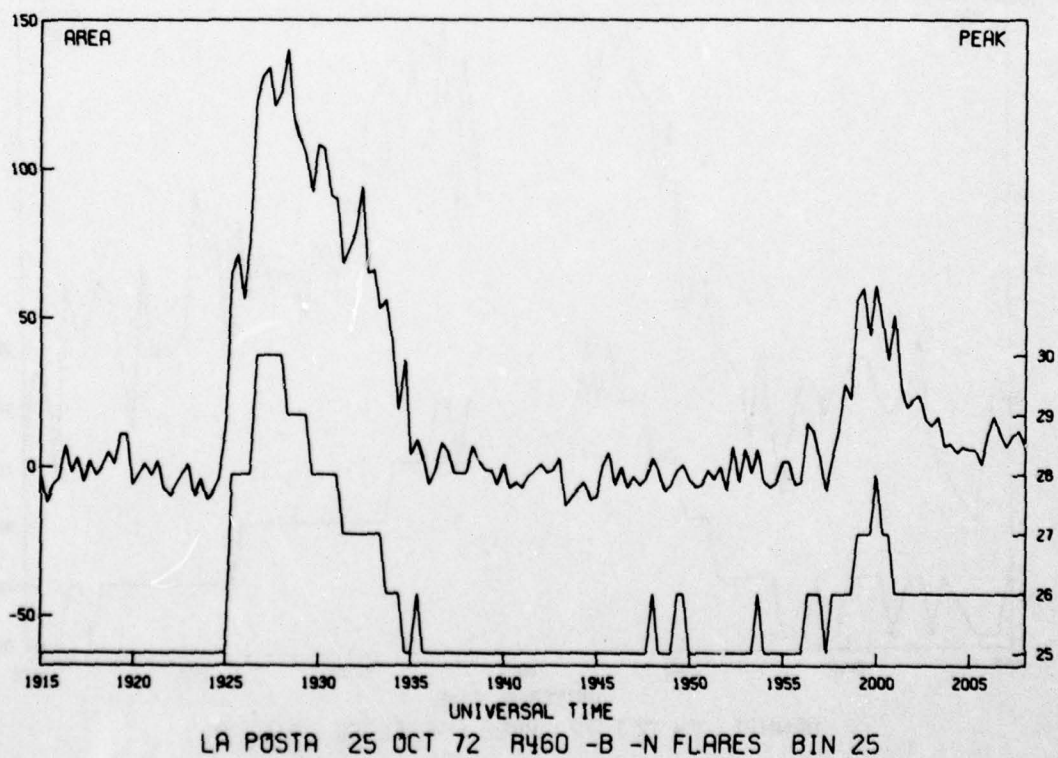
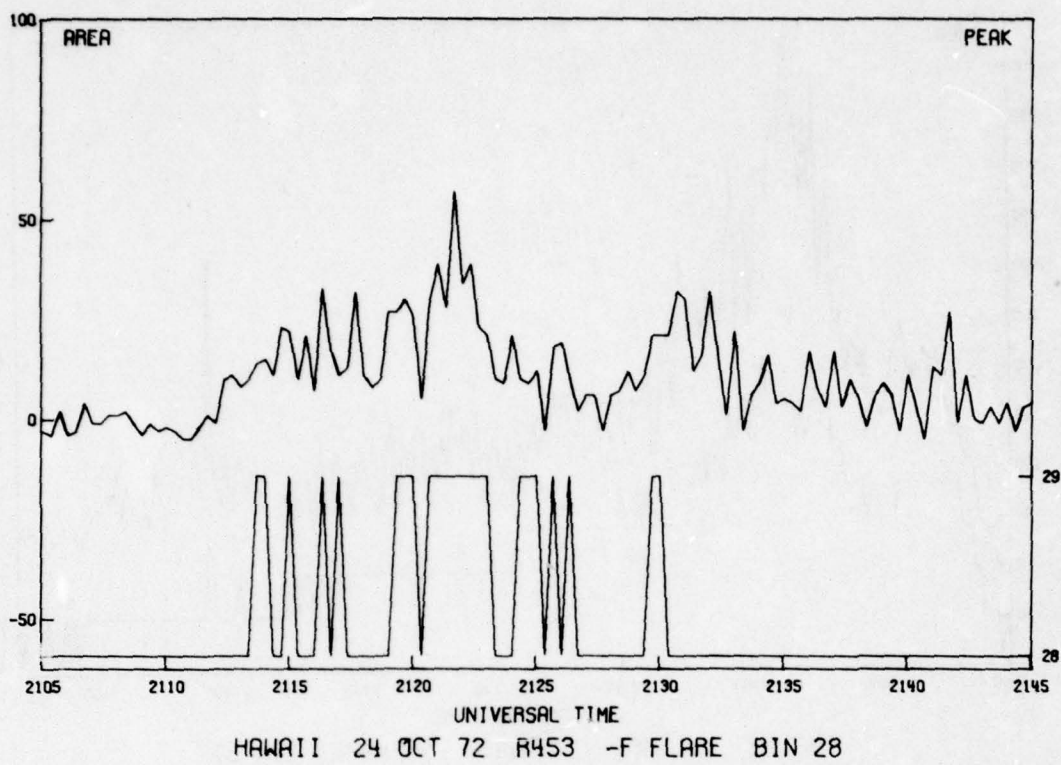


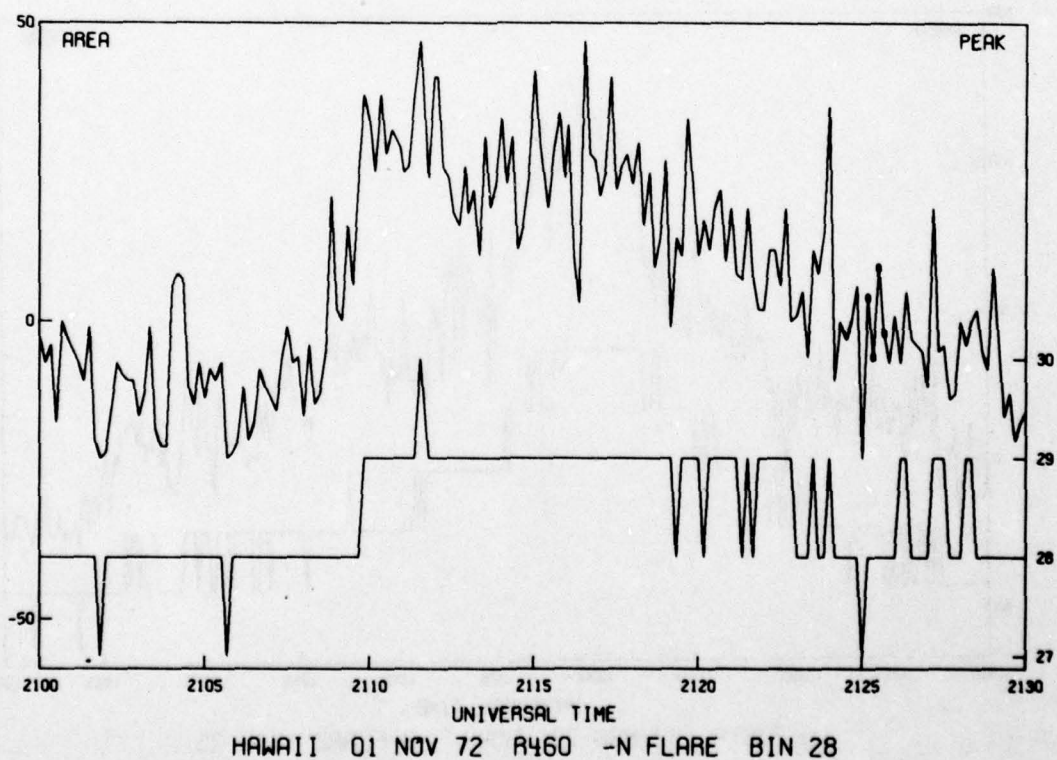
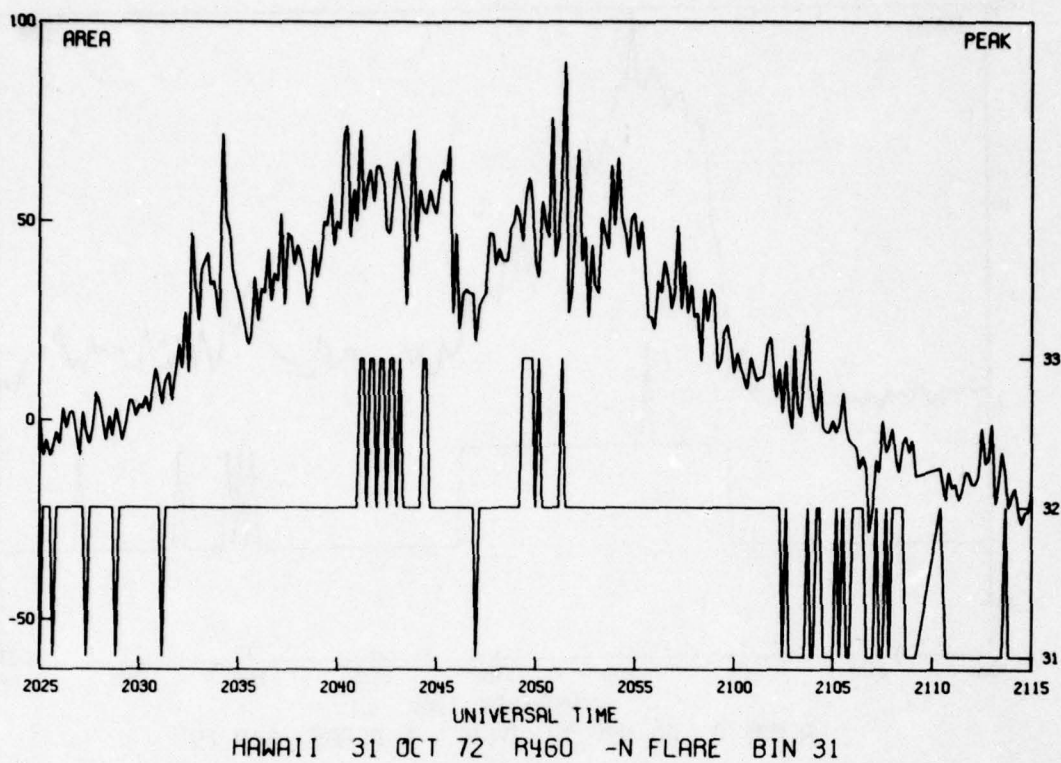
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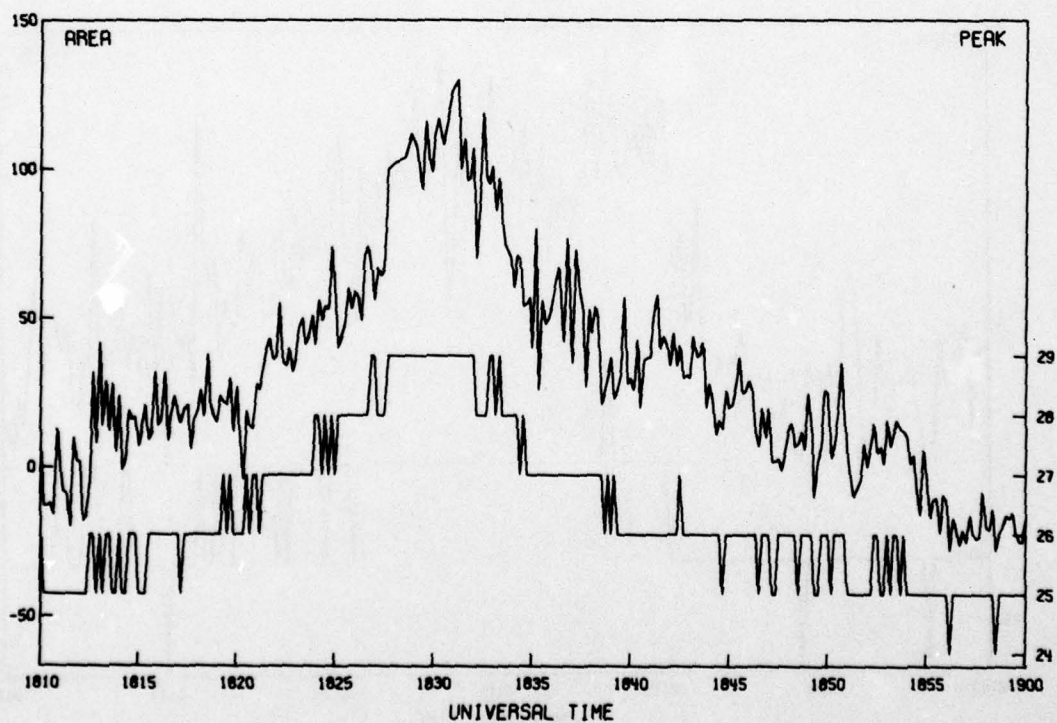
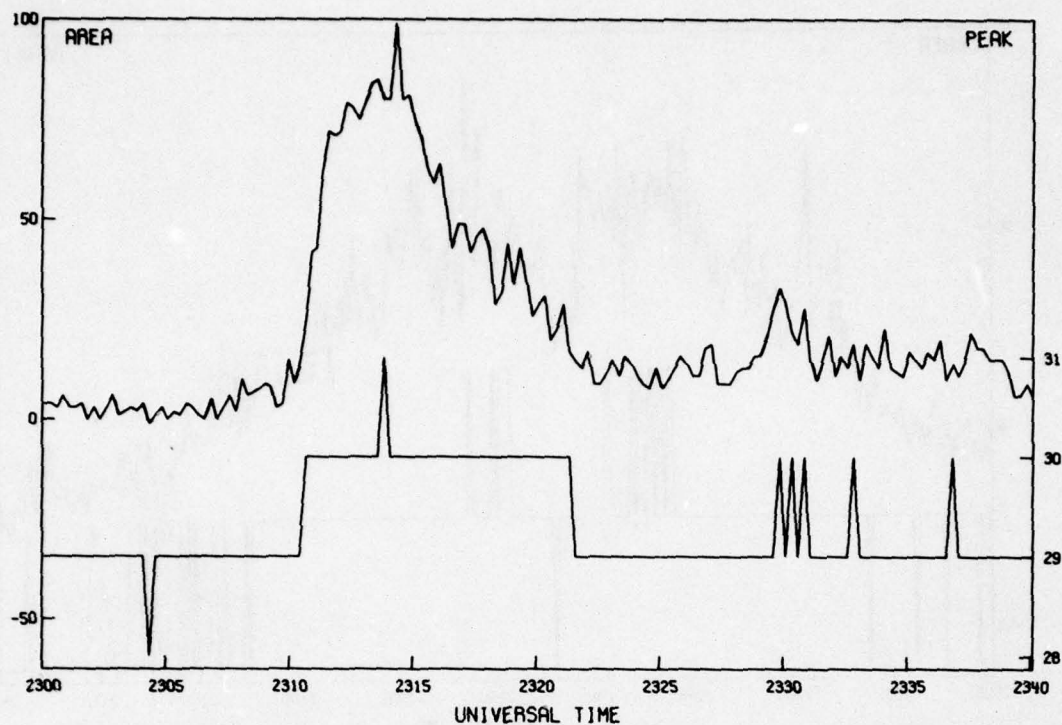


HAWAII 24 OCT 72 R453 -F FLARE BIN 28

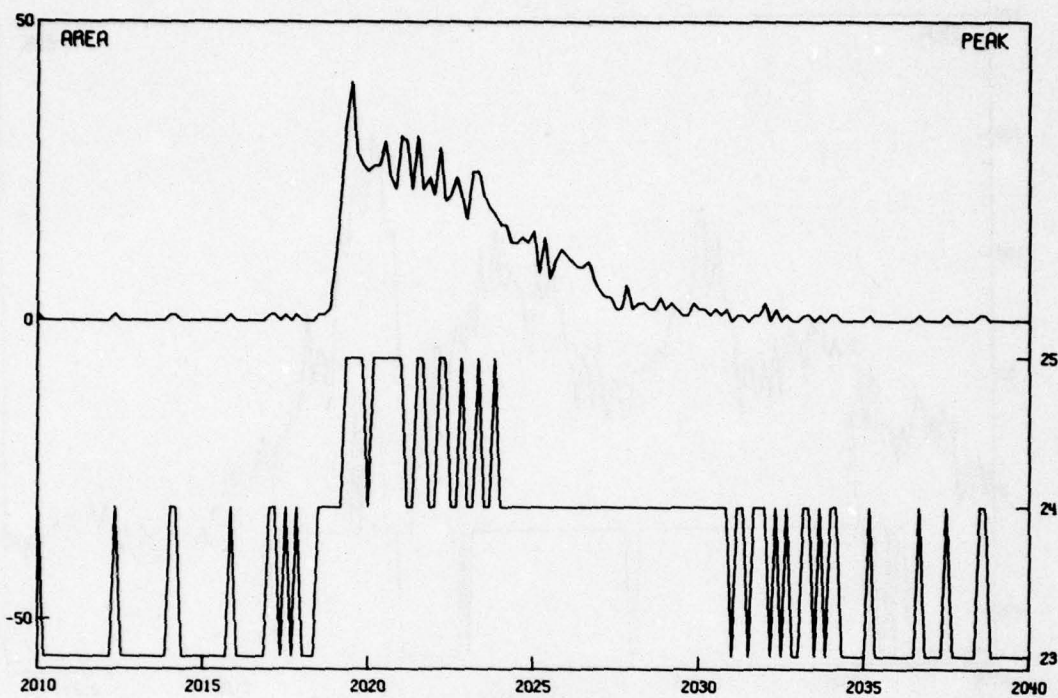




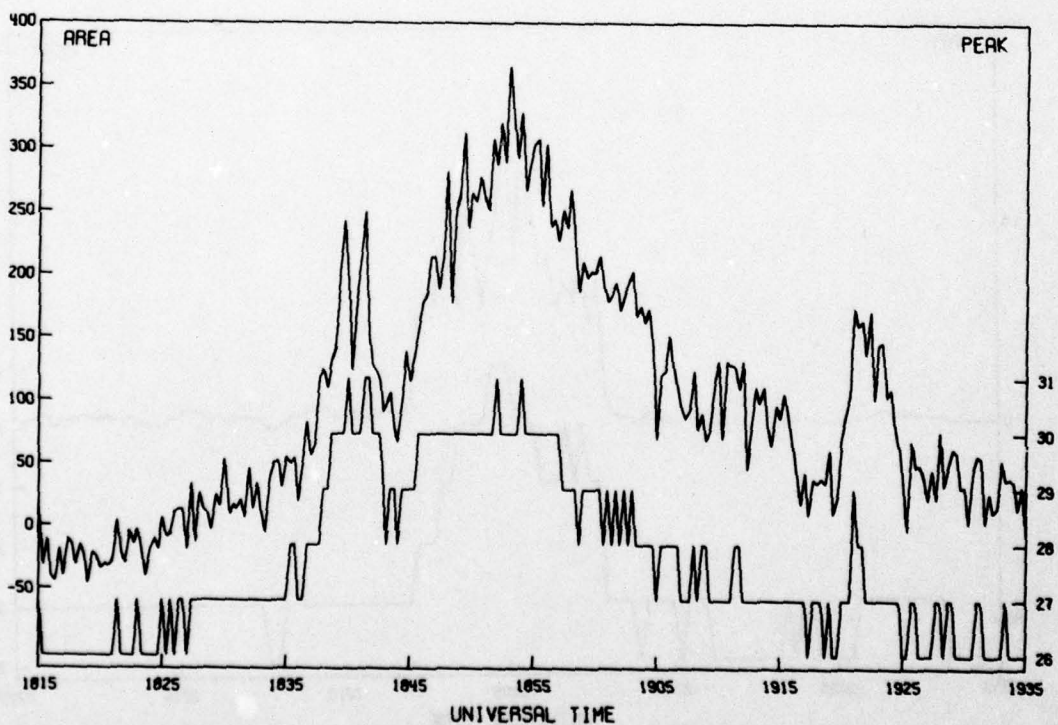




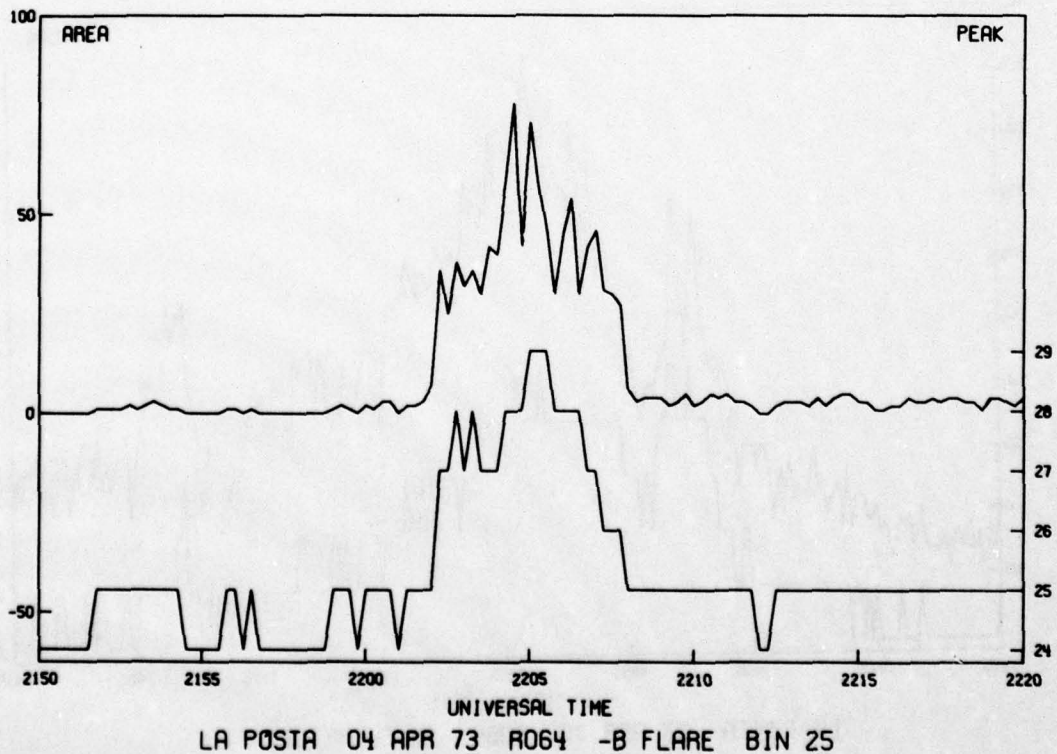
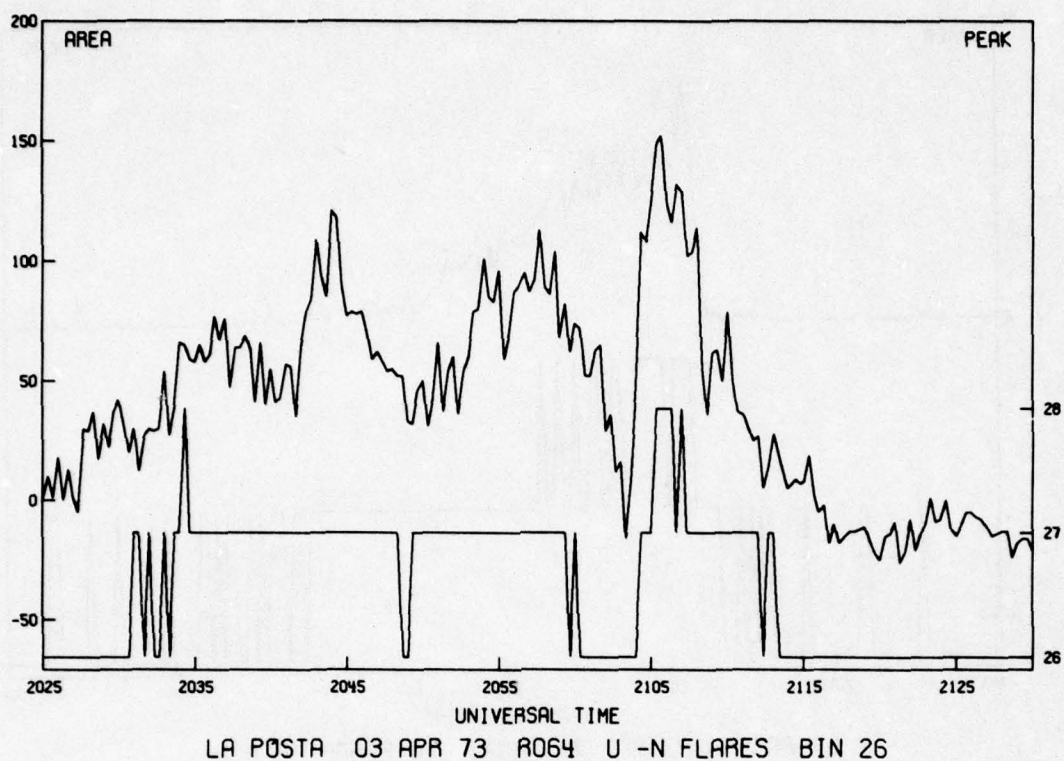


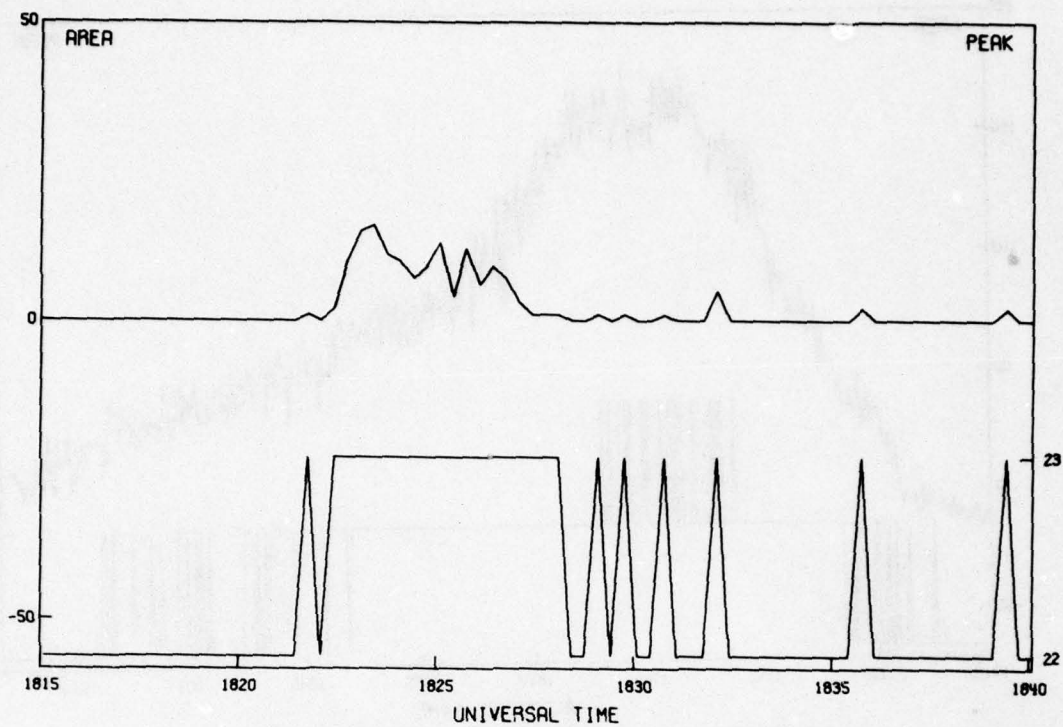


LA POSTA 03 MAR 73 R044 -F FLARE BIN 24

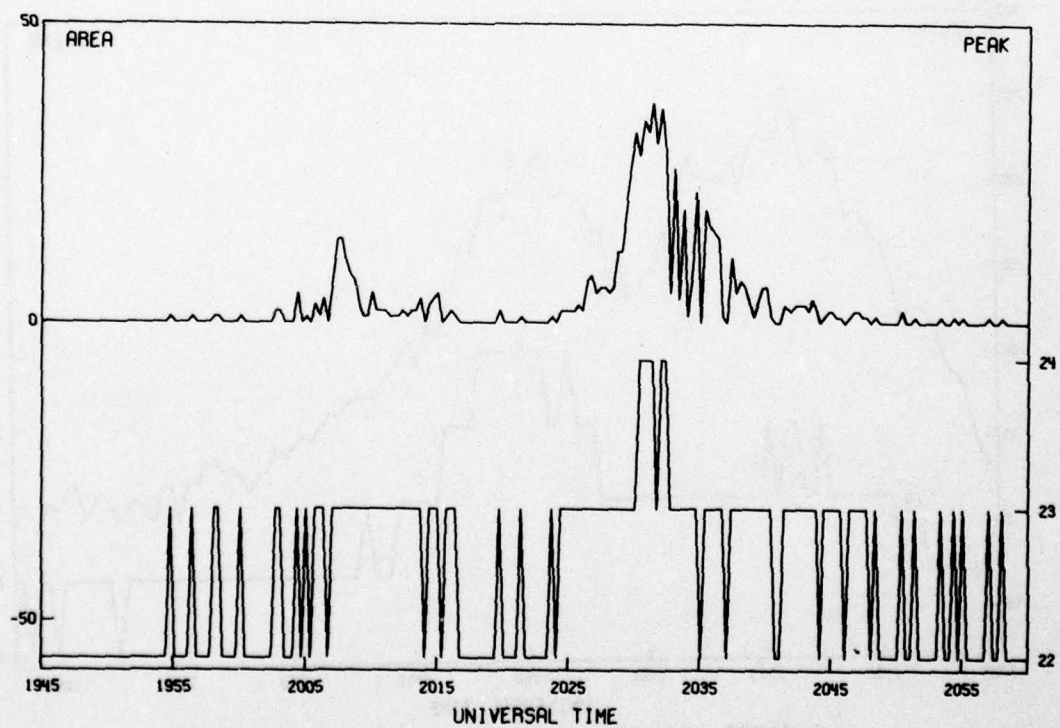


LA POSTA 03 APR 73 R064 IN FLARE BIN 26



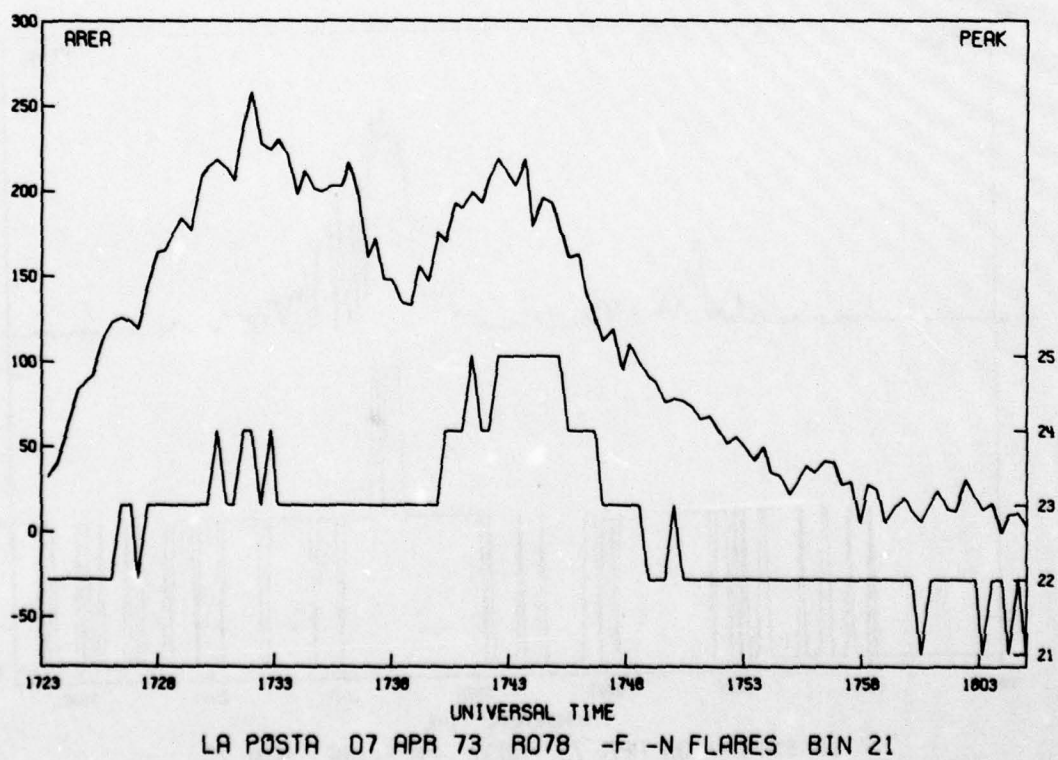
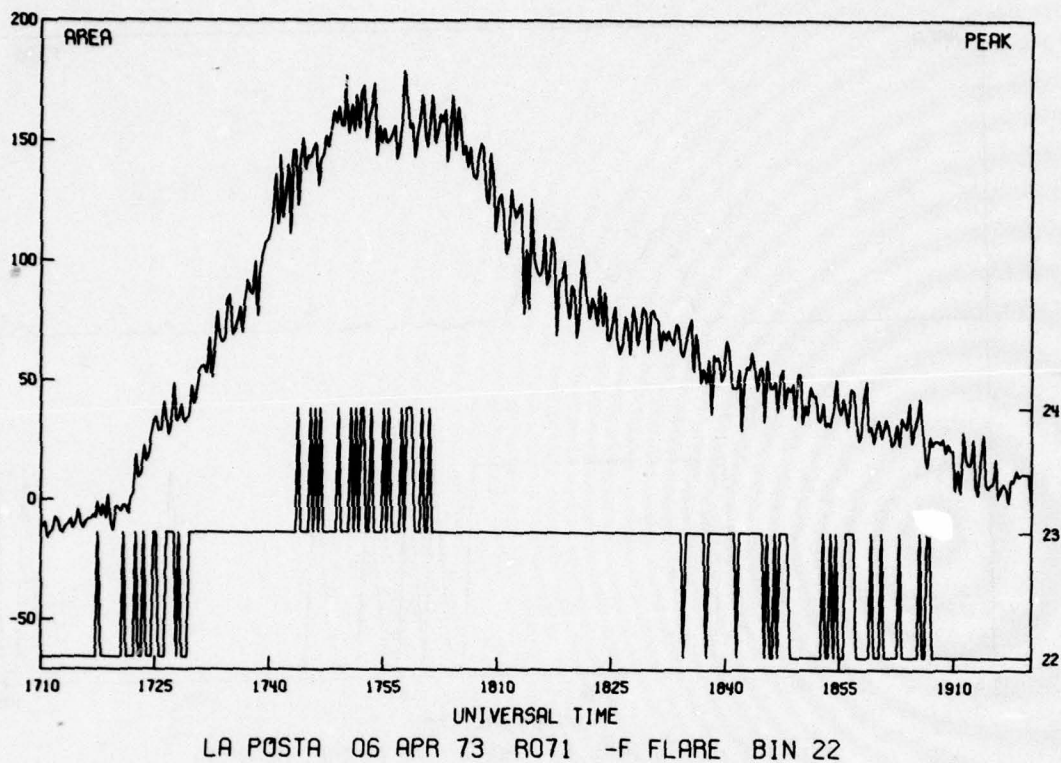


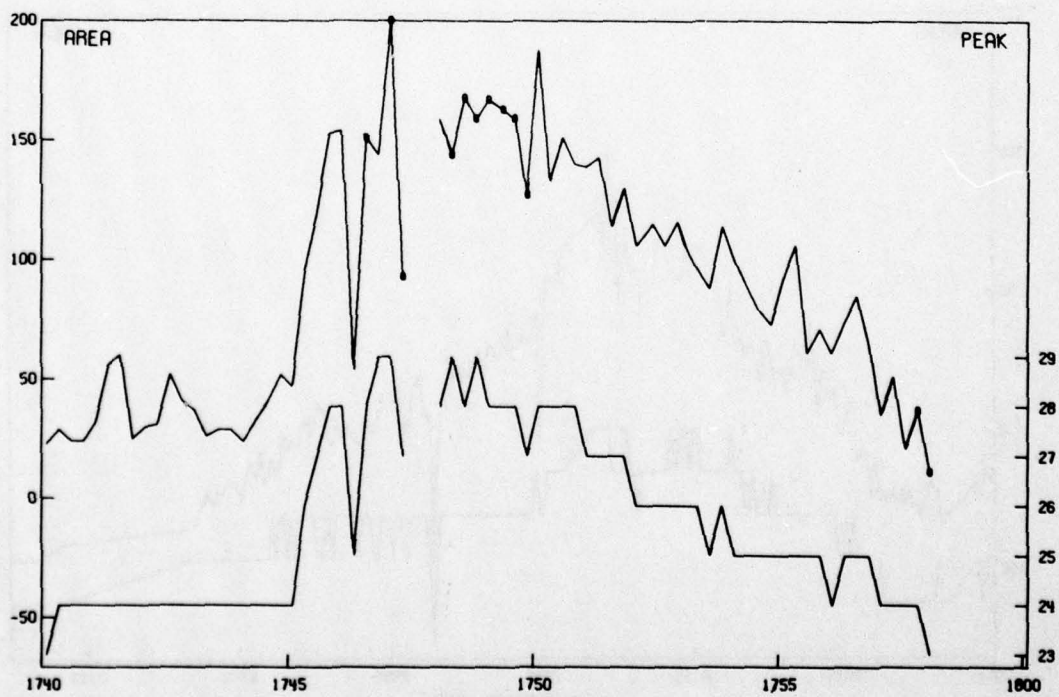
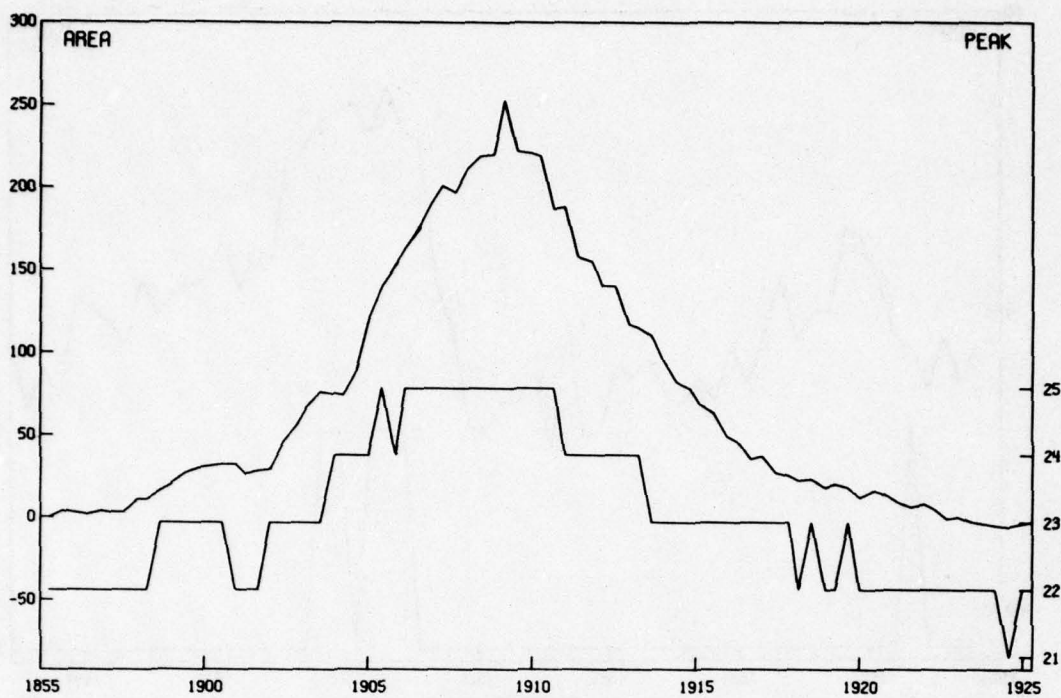
LA POSTA 05 APR 73 R067 -F FLARE BIN 23

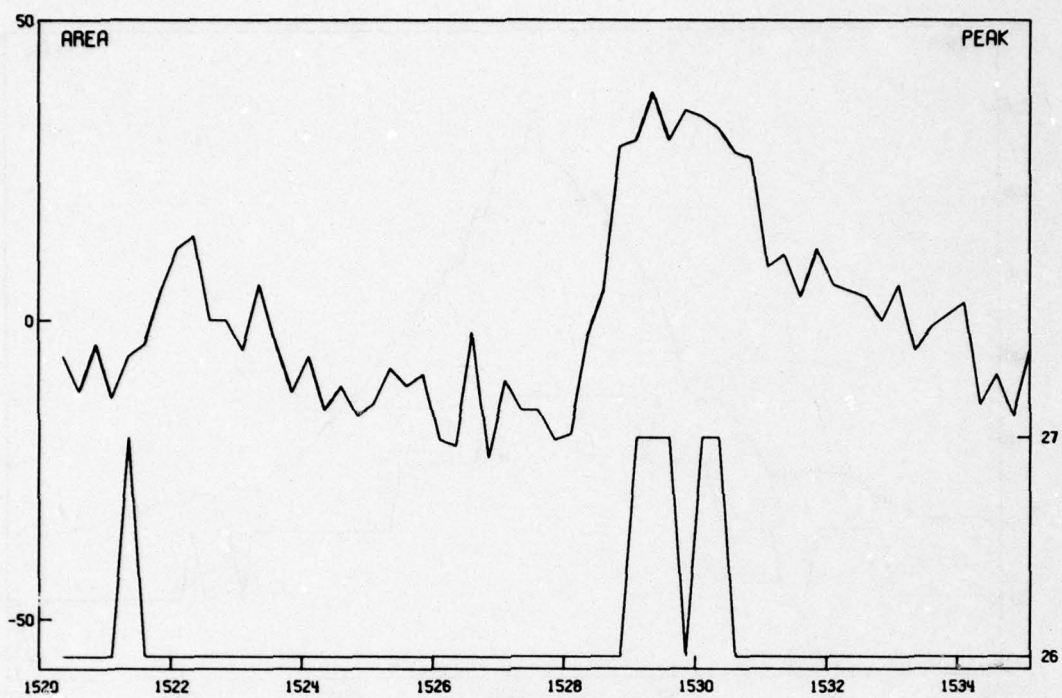


LA POSTA 05 APR 73 R067 -N FLARE BIN 23

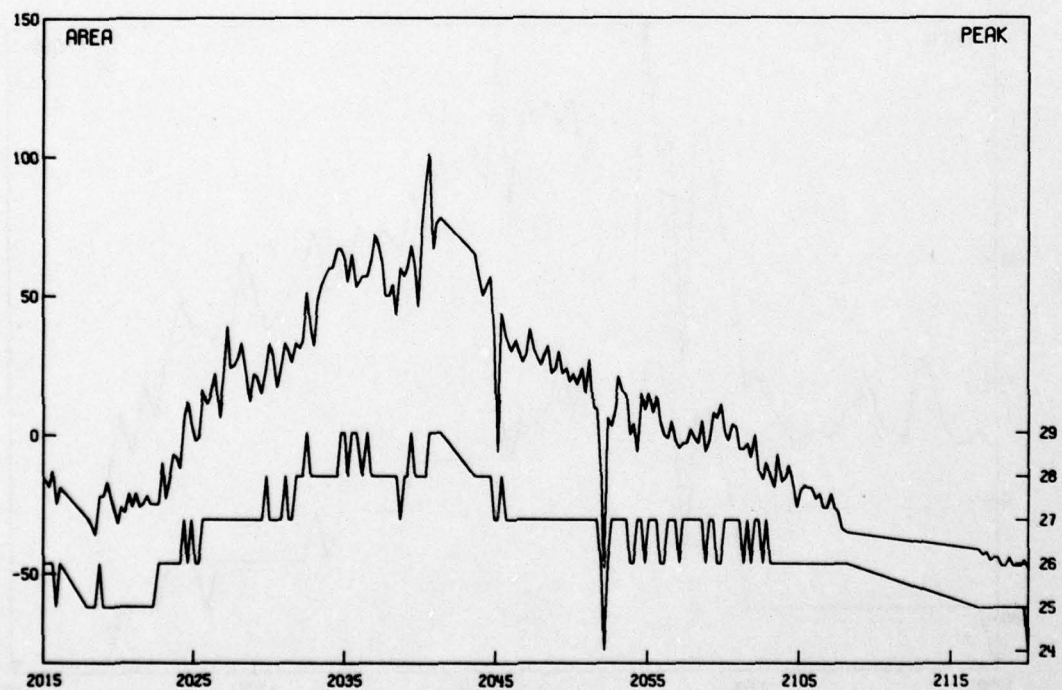






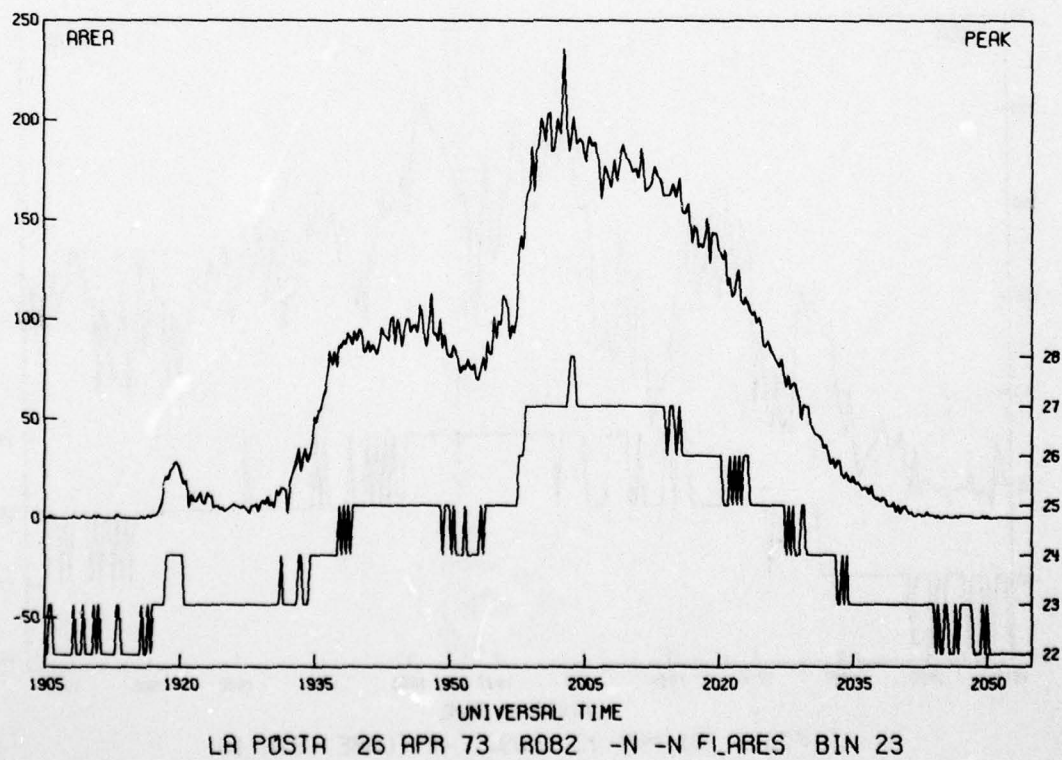
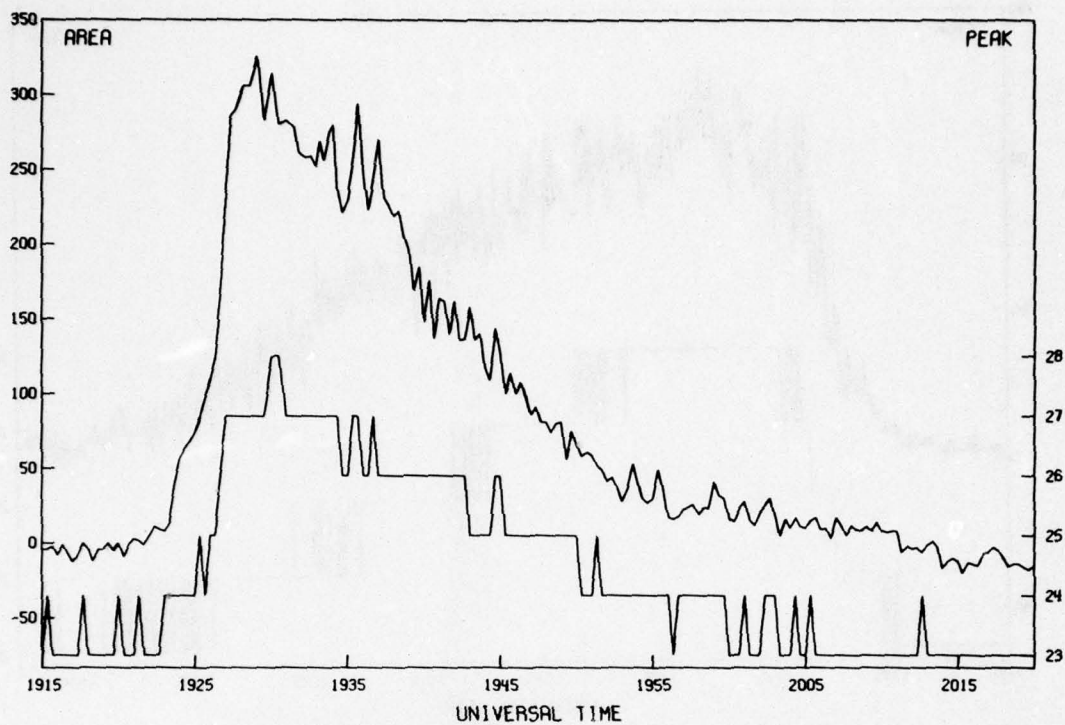


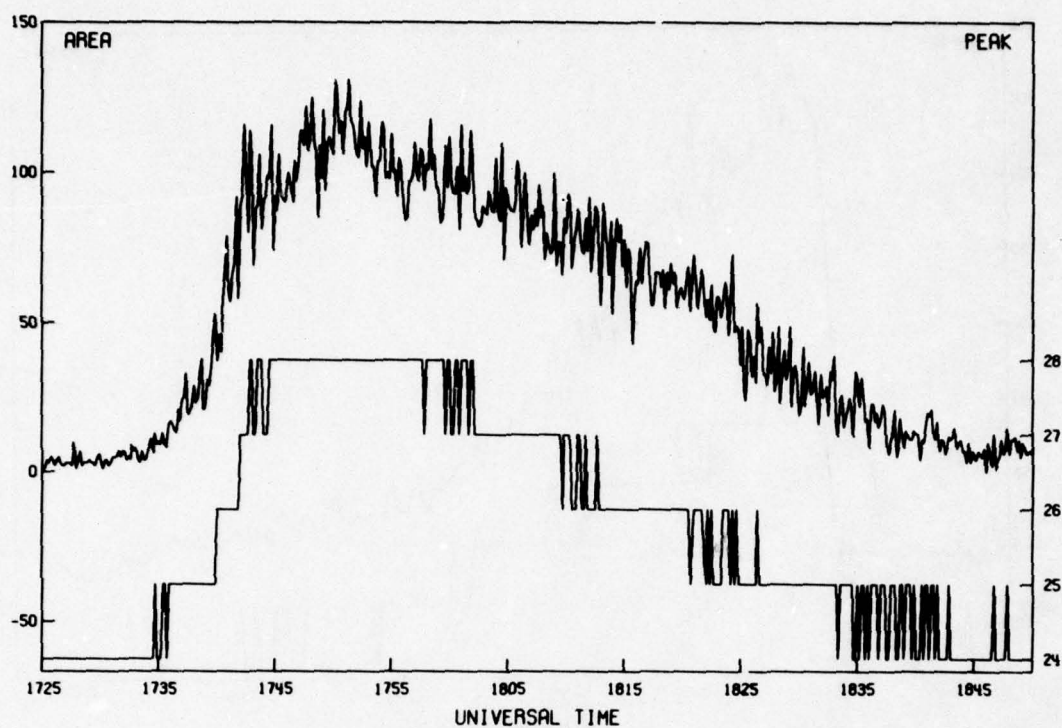
LA POSTA 11 APR 73 R077 -F FLARE BIN 25



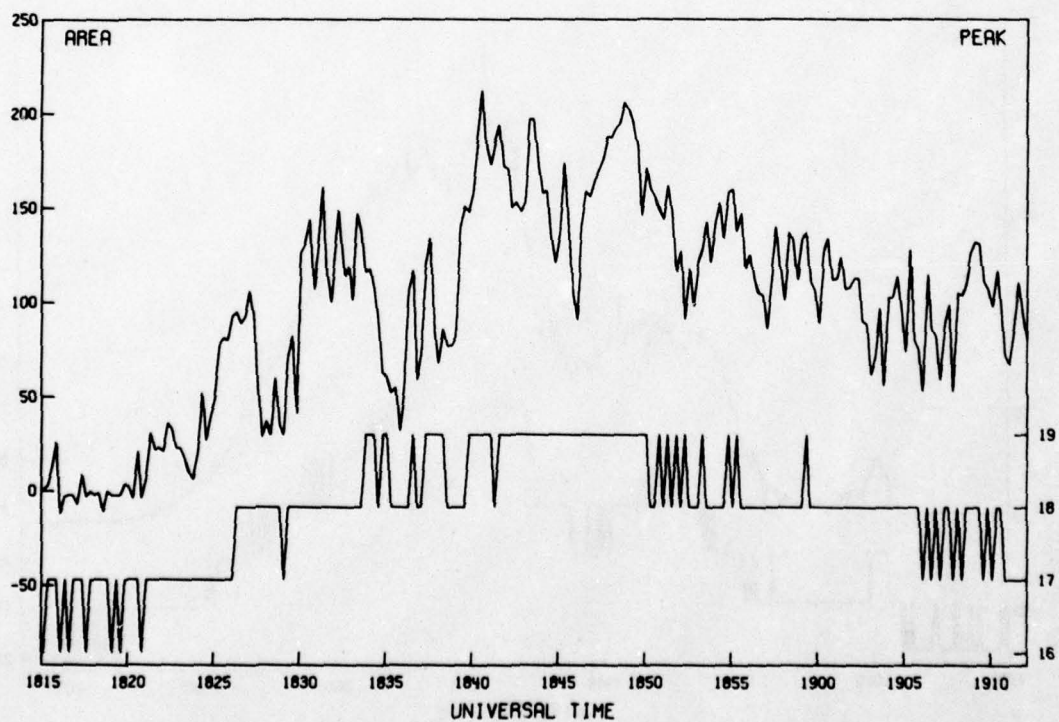
LA POSTA 11 APR 73 R077 1B FLARE BIN 25



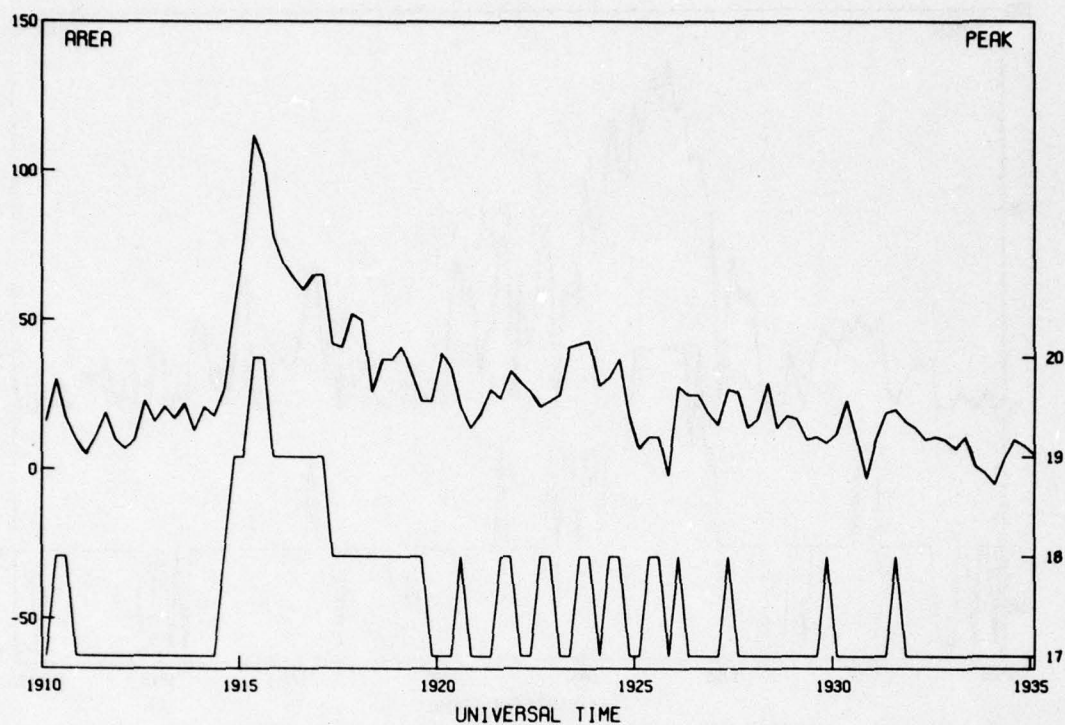




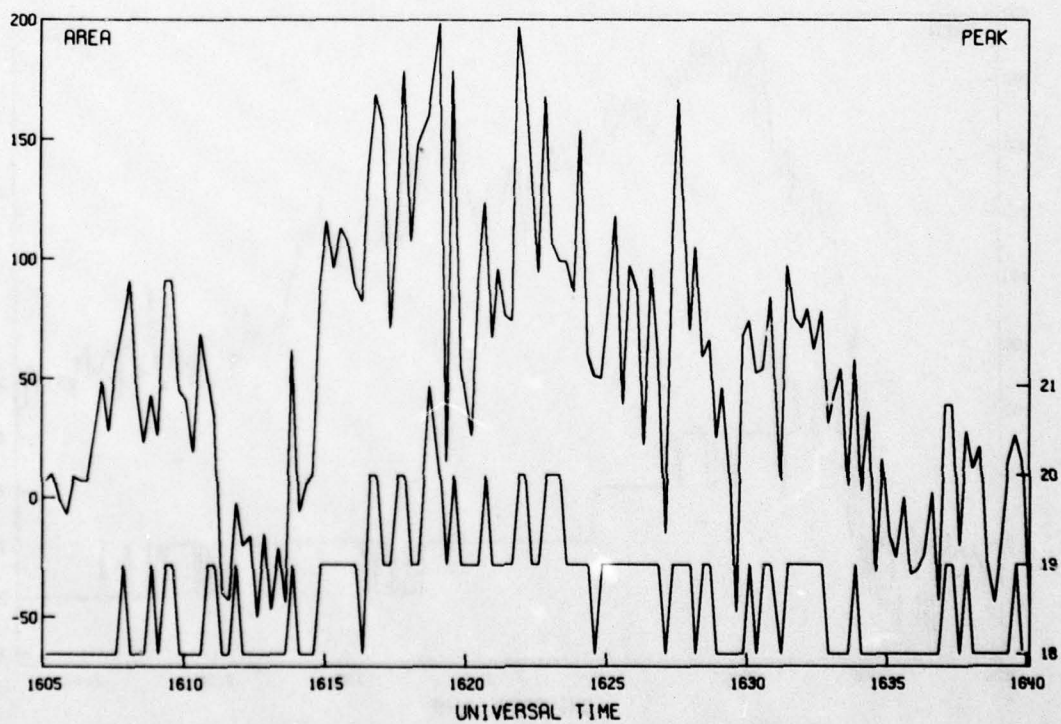
LA POSTA 28 APR 73 R085 -F FLARE BIN 24



LA POSTA 01 MAY 73 R092 -F FLARE BIN 16

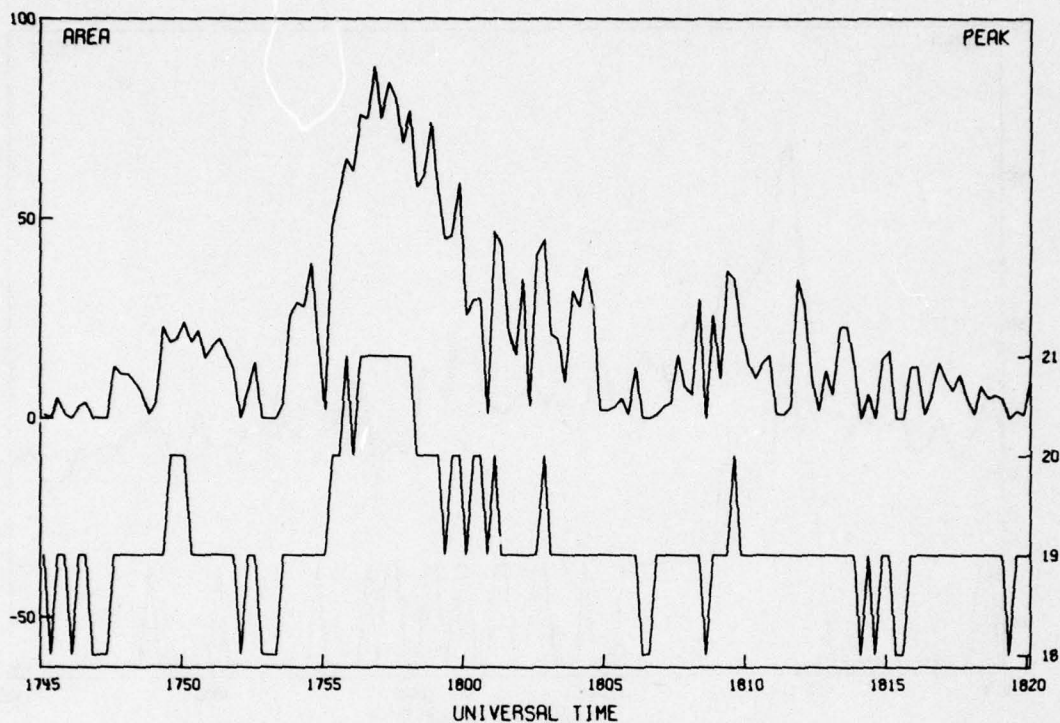


LA POSTA 01 MAY 73 R092 -F FLARE BIN 17

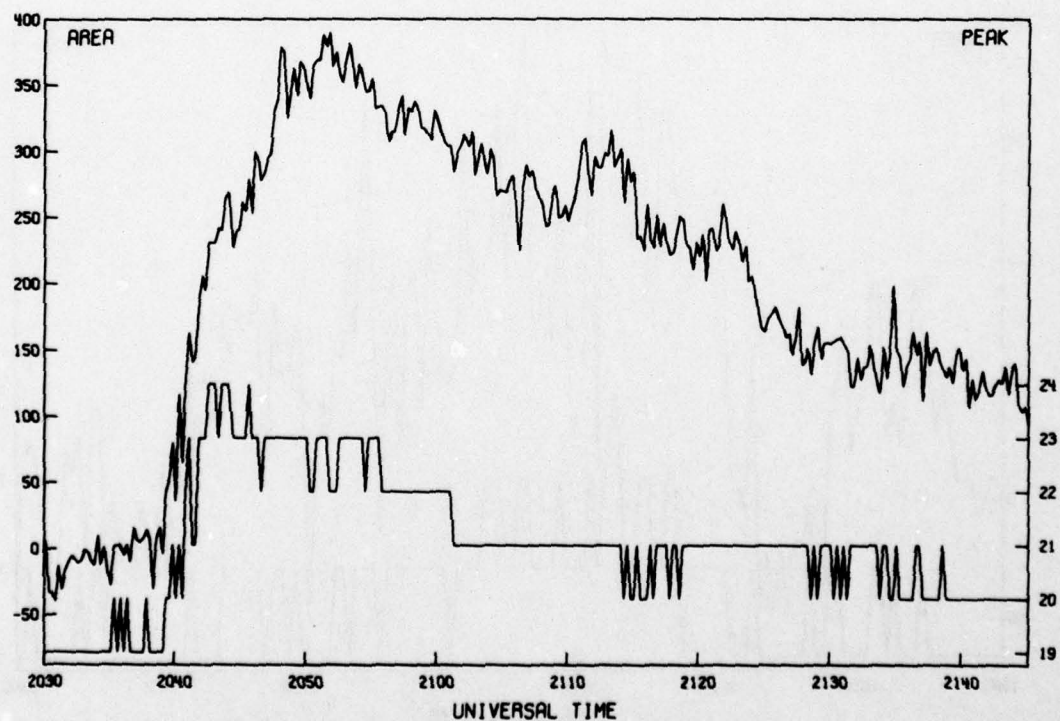


LA POSTA 02 MAY 73 R092 -F FLARE BIN 18

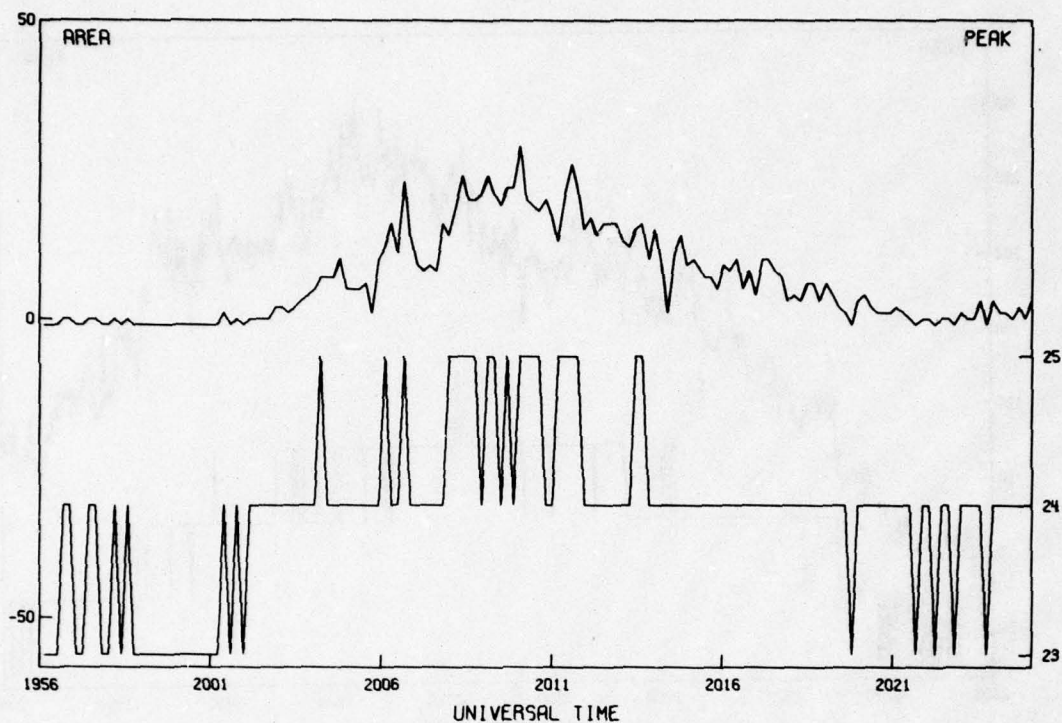




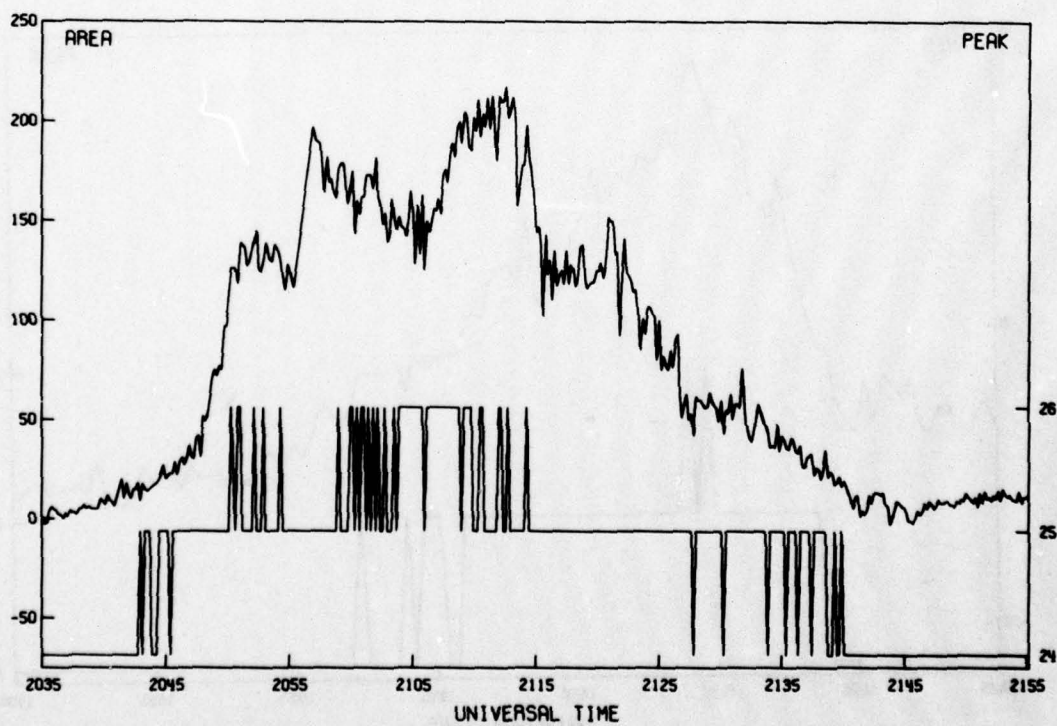
LA POSTA 02 MAY 73 R092 -N FLARE BIN 19



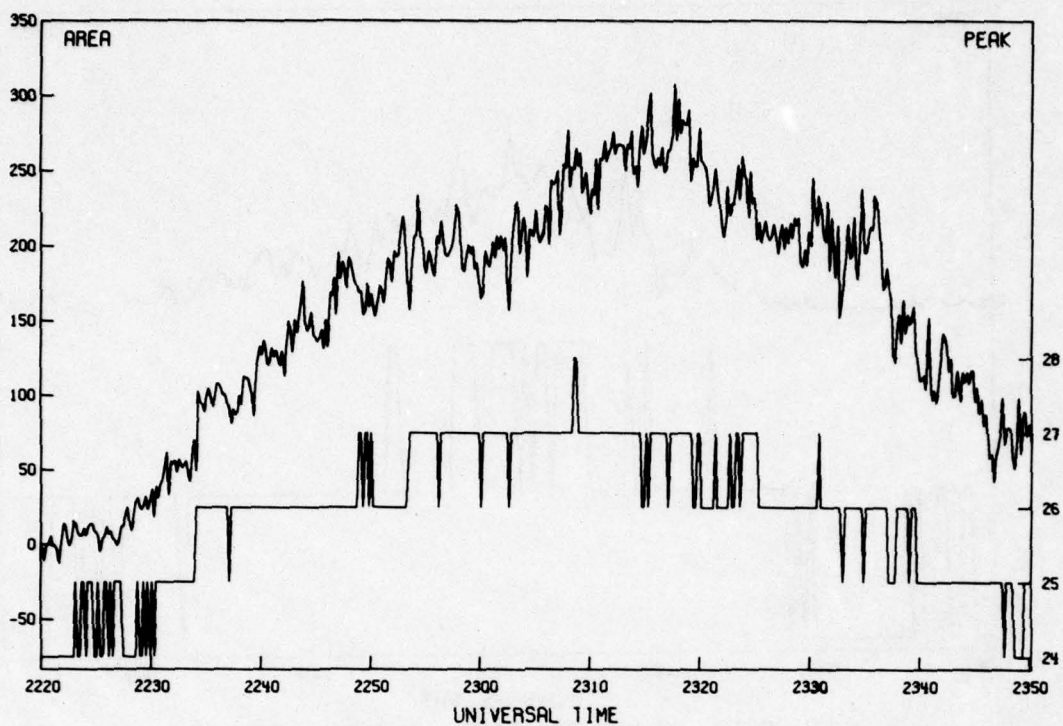
LA POSTA 02 MAY 73 R092 -B FLARE BIN 19



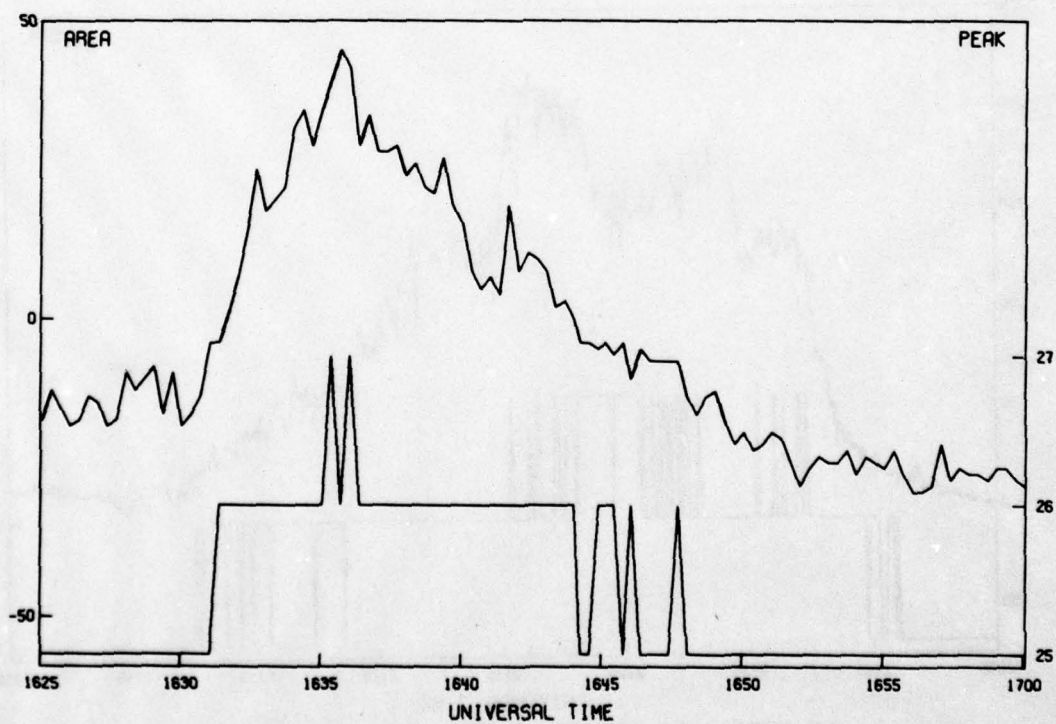
LA POSTA 07 MAY 73 R092 -N FLARE BIN 24



LA POSTA 07 MAY 73 R092 -F -F FLARES BIN 24

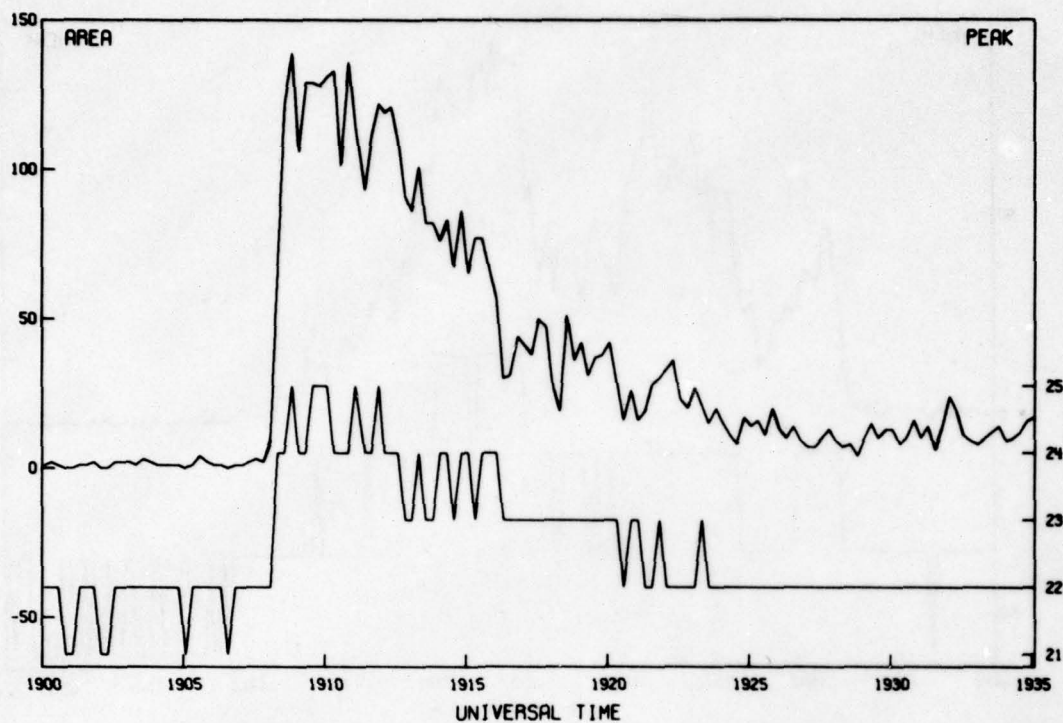


LA POSTA 07 MAY 73 R092 -N FLARE BIN 24

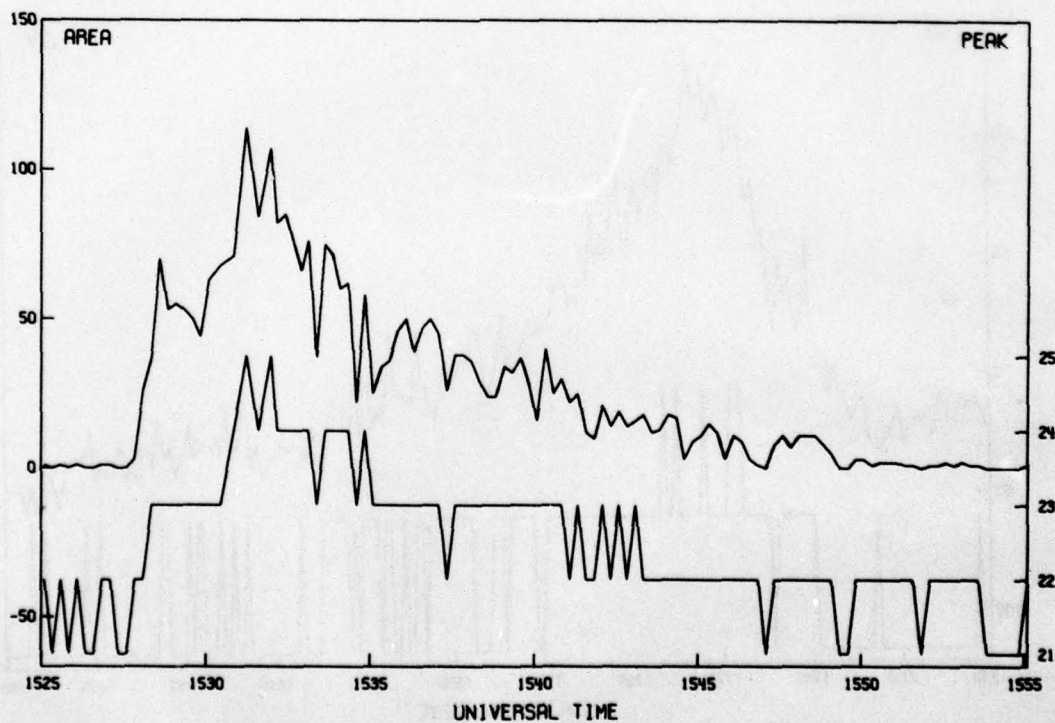


LA POSTA 09 MAY 73 R092 -F FLARE BIN 25

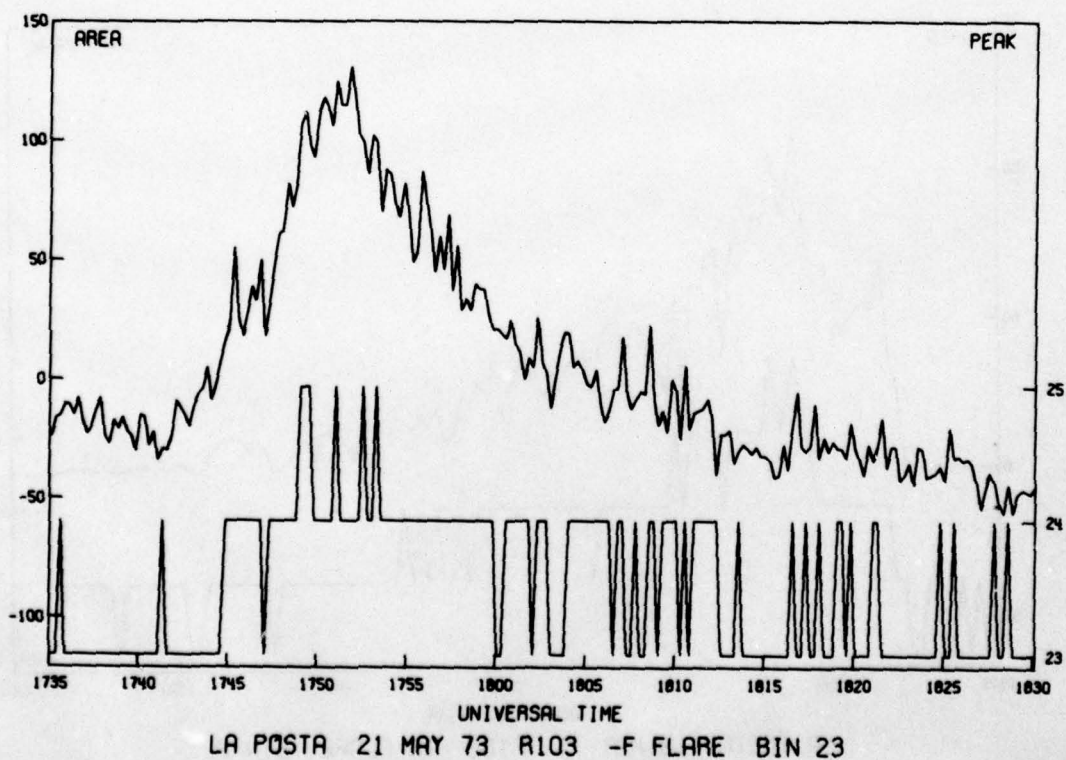
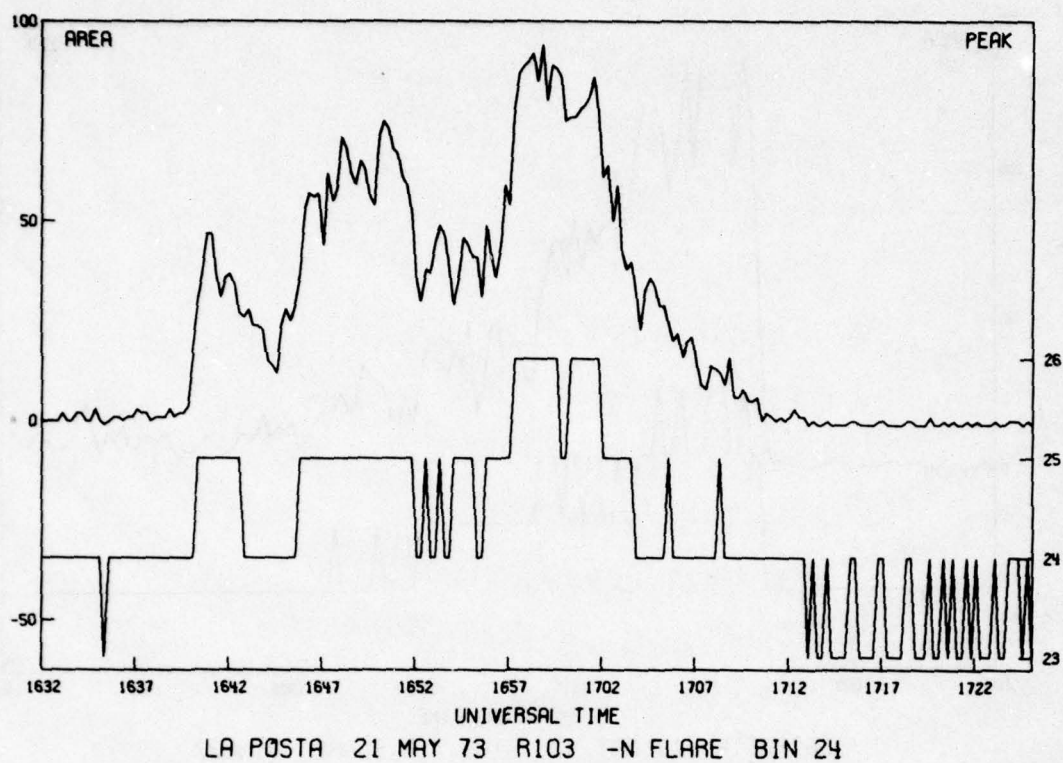


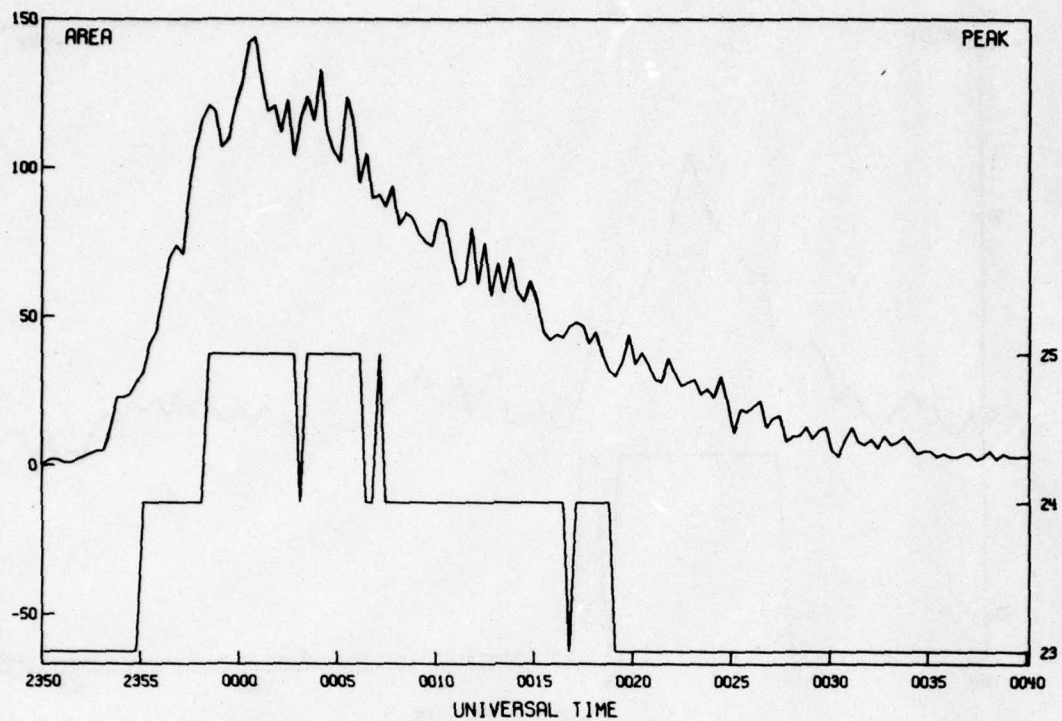


LA POSTA 17 MAY 73 R103 1B FLARE BIN 22

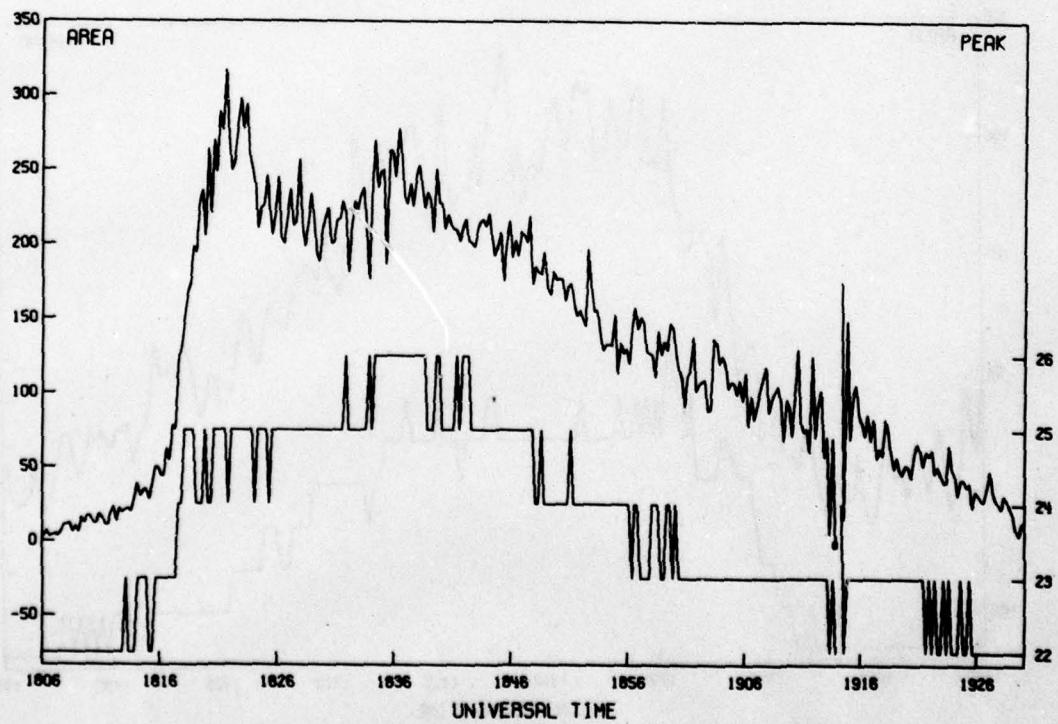


LA POSTA 18 MAY 73 R103 1B FLARE BIN 22



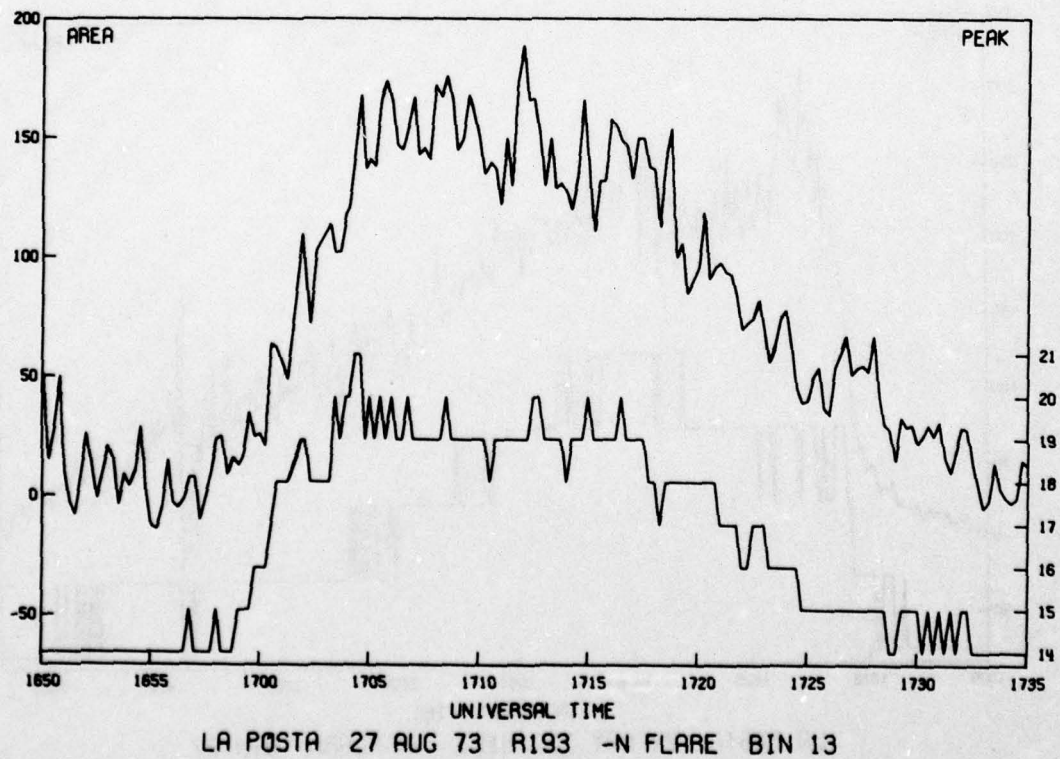
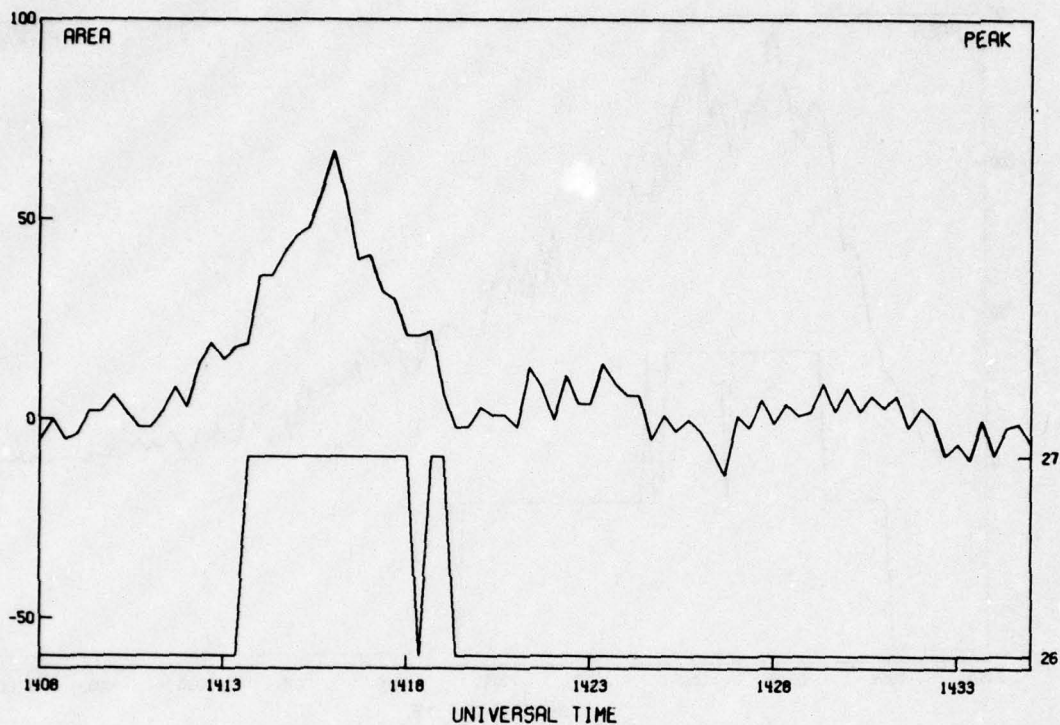


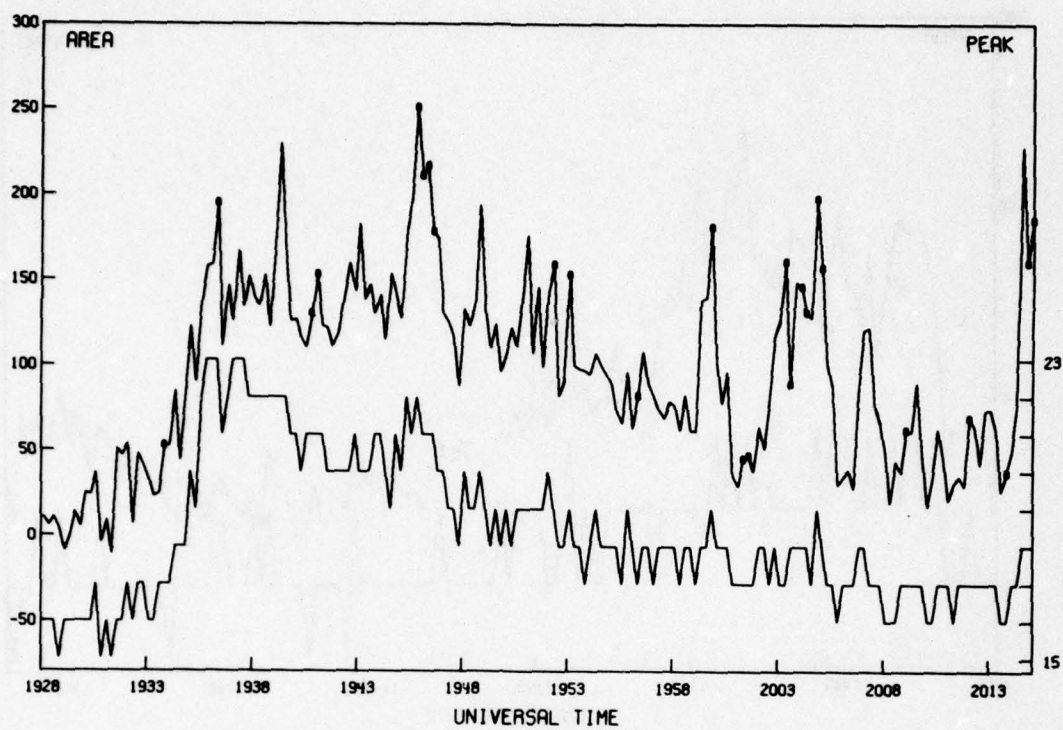
LA POSTA 23 MAY 73 R103 IN FLARE BIN 23



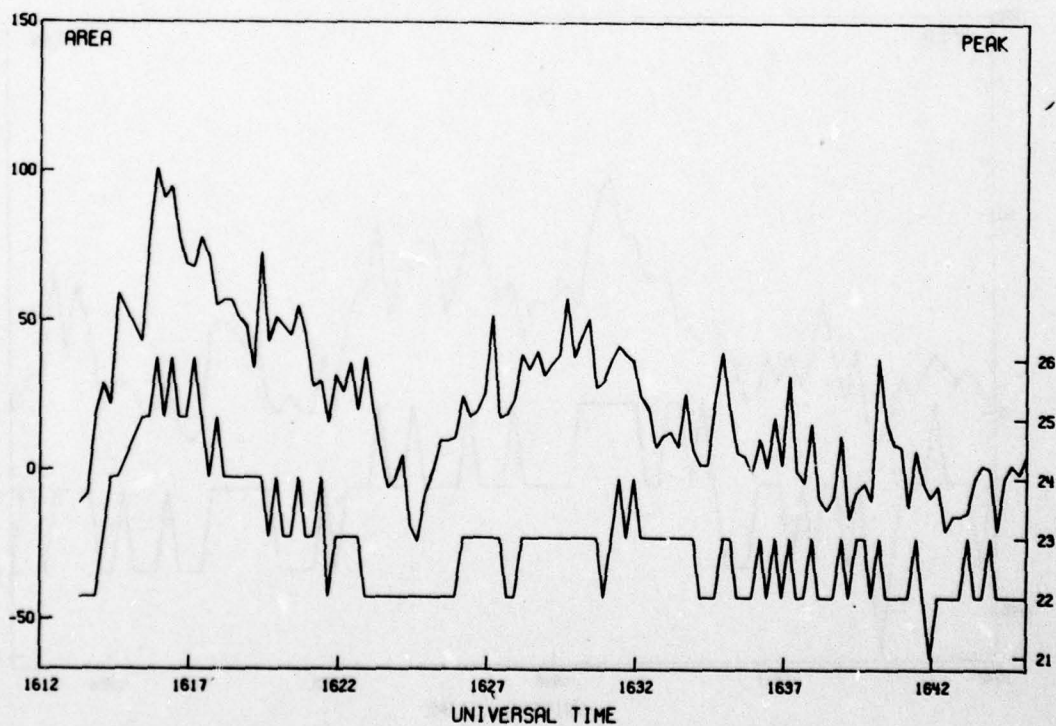
LA POSTA 24 MAY 73 R103 -N FLARE BIN 22



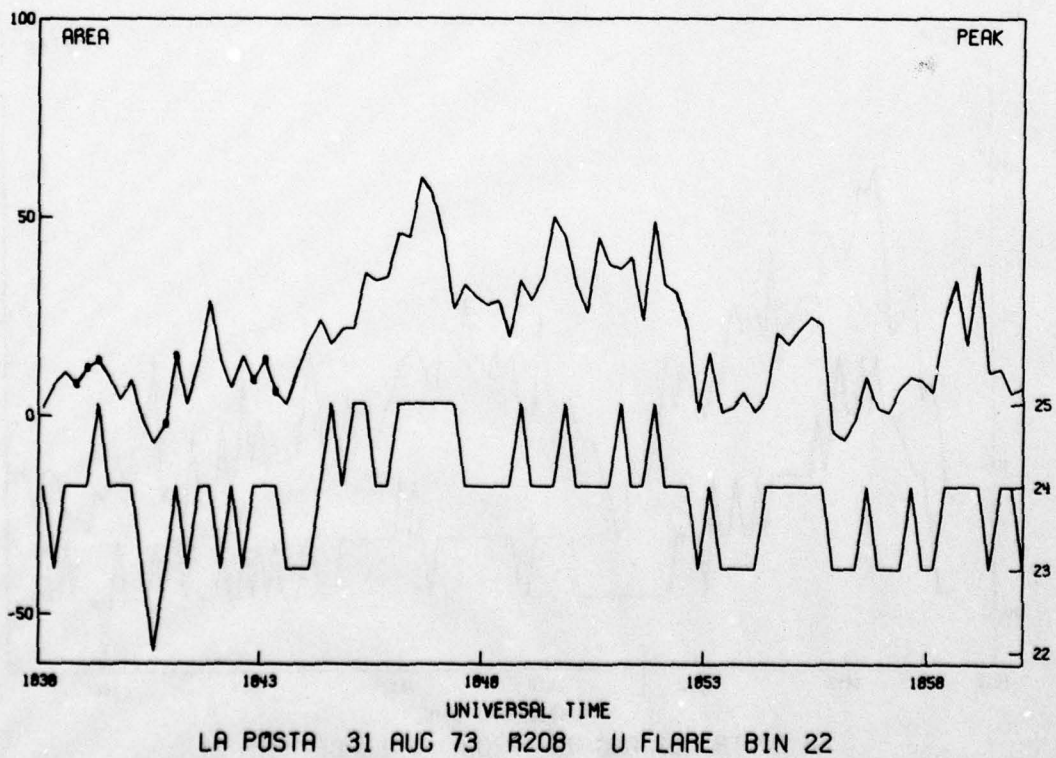
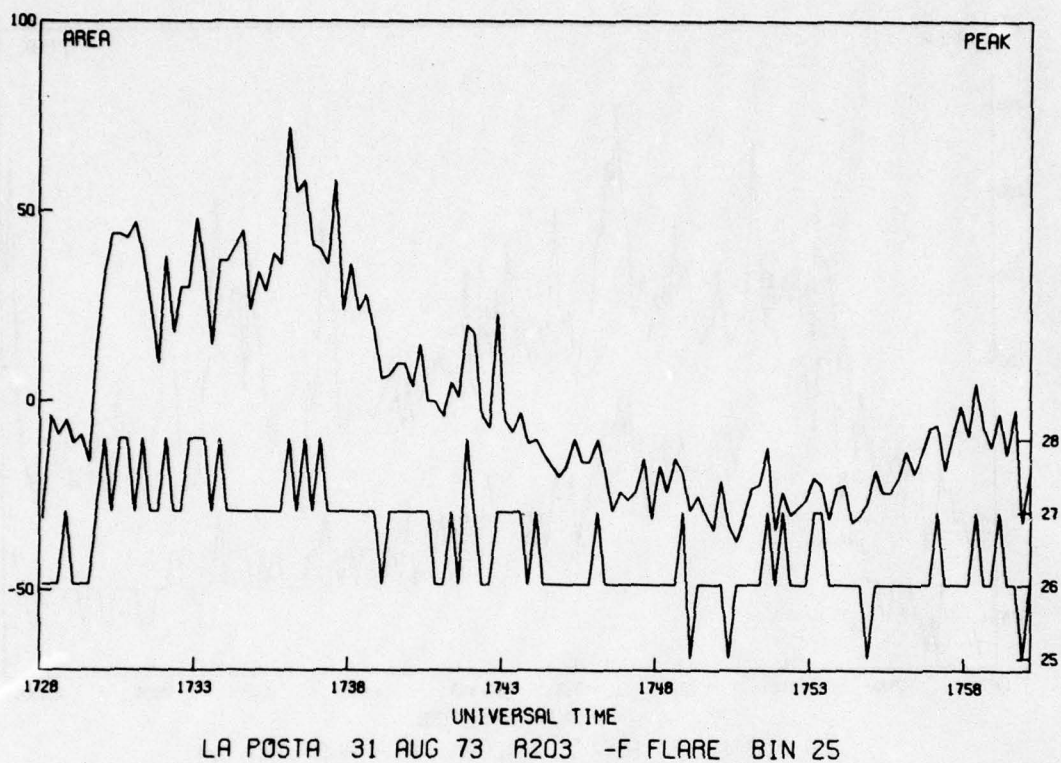




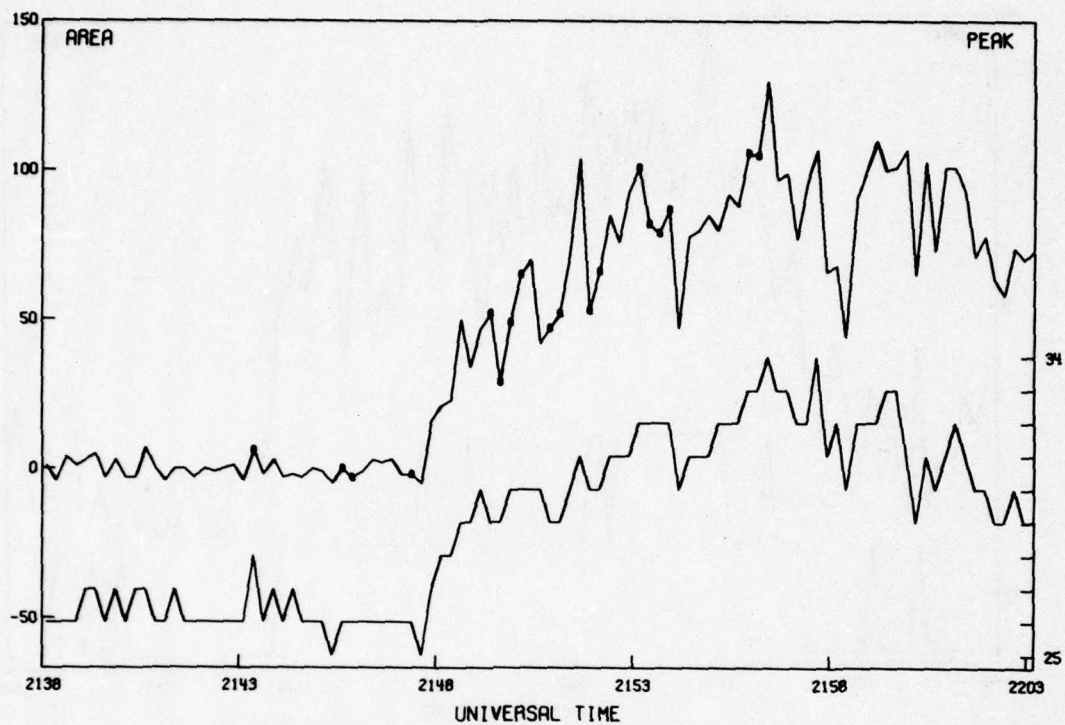
LA POSTA 30 AUG 73 R209 -N FLARE BIN 14



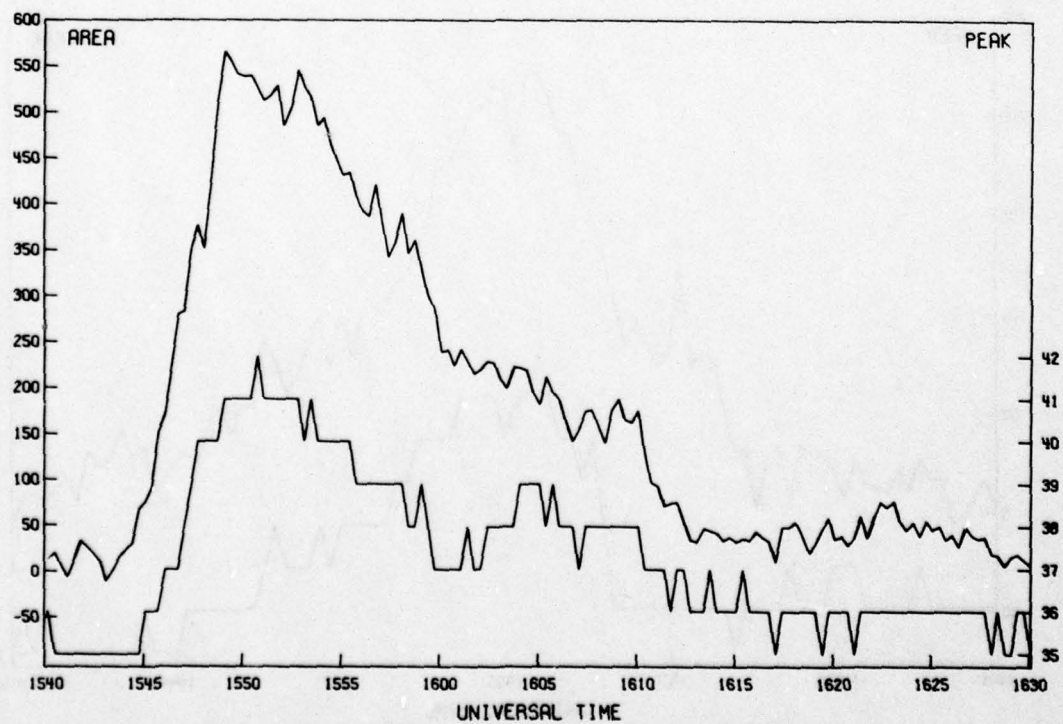
LA POSTA 31 AUG 73 R209 -F FLARE BIN 21



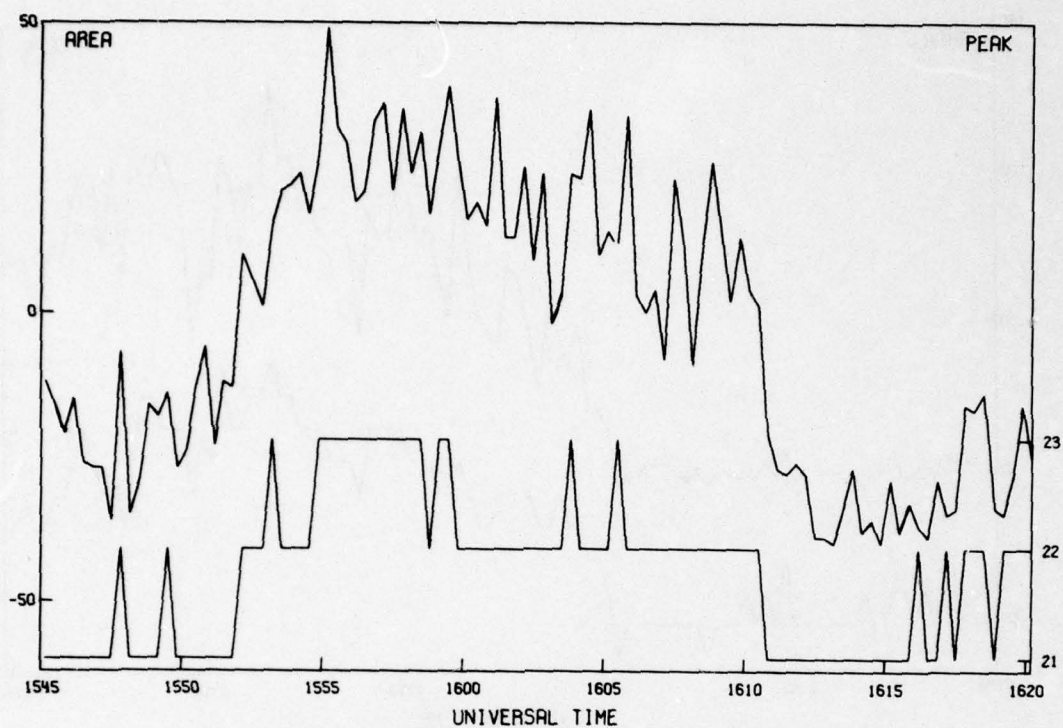




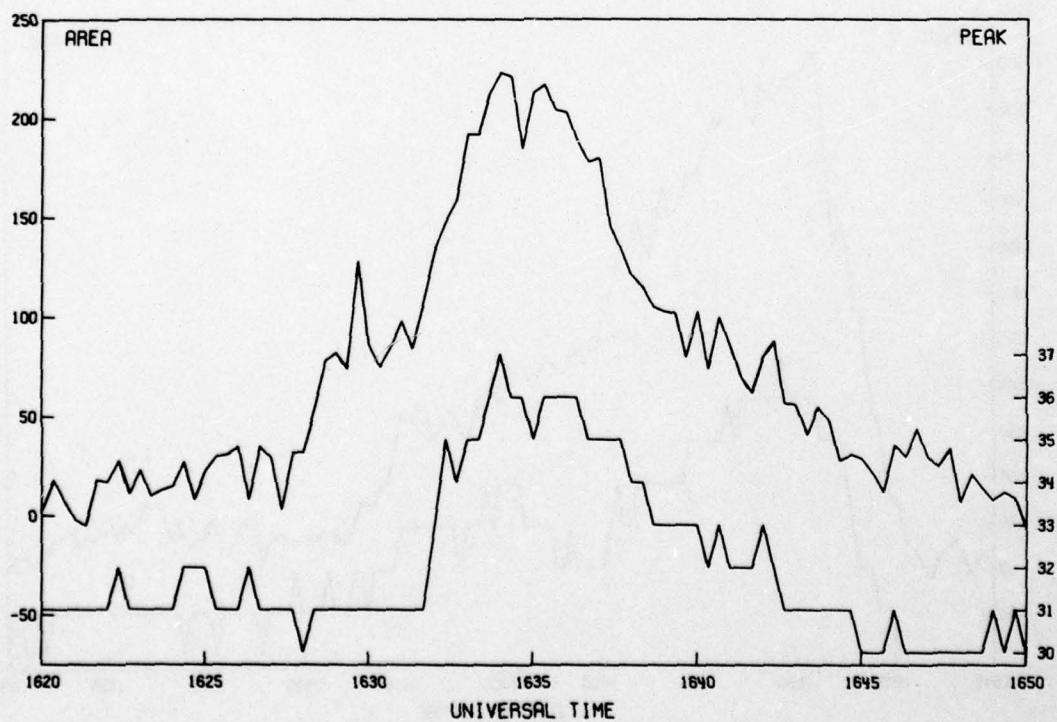
LA POSTA 31 AUG 73 A203 -F FLARE BIN 26



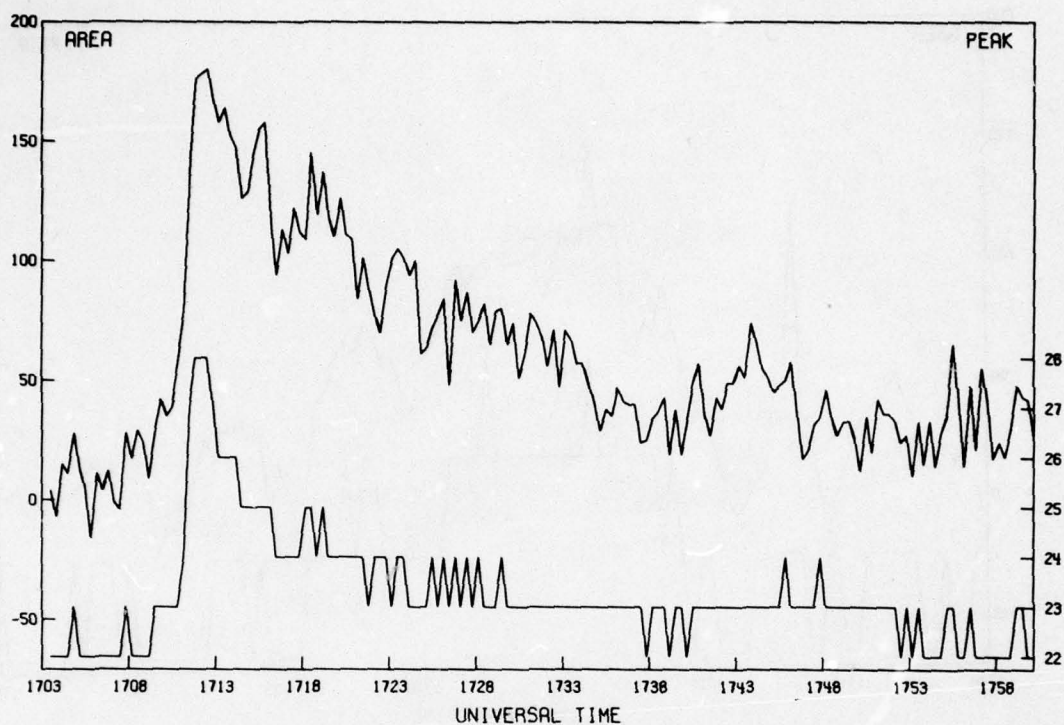
LA POSTA 04 SEP 73 A209 -N FLARE BIN 33



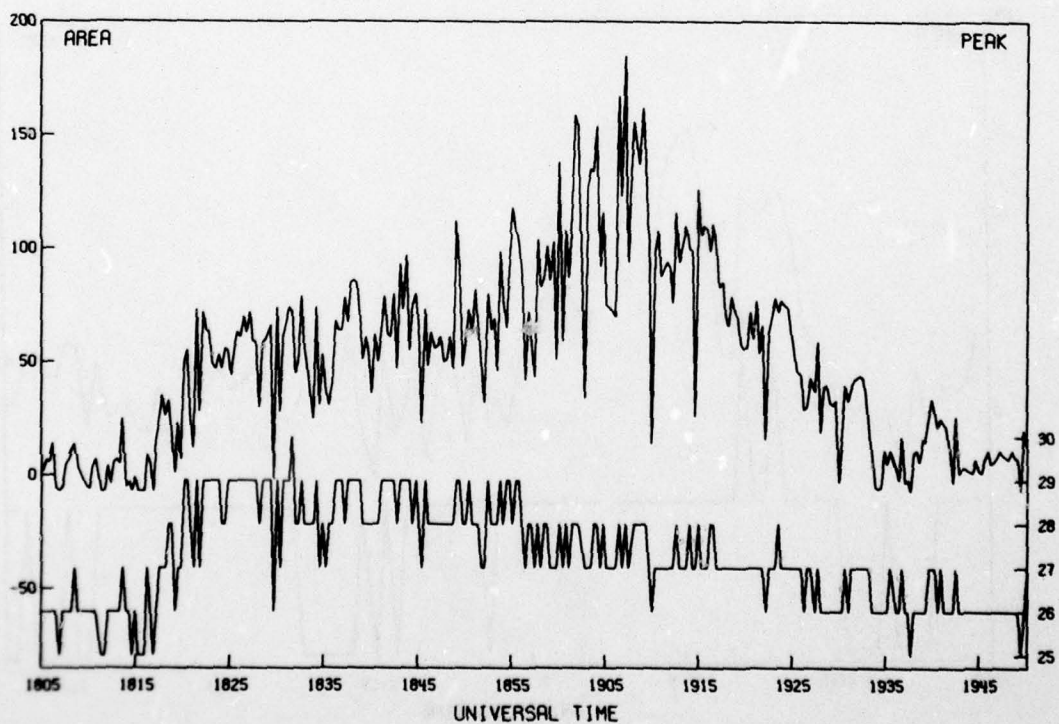
LA POSTA 04 SEP 73 R219 U FLARE BIN 20



LA POSTA 04 SEP 73 R212 -N FLARE BIN 26

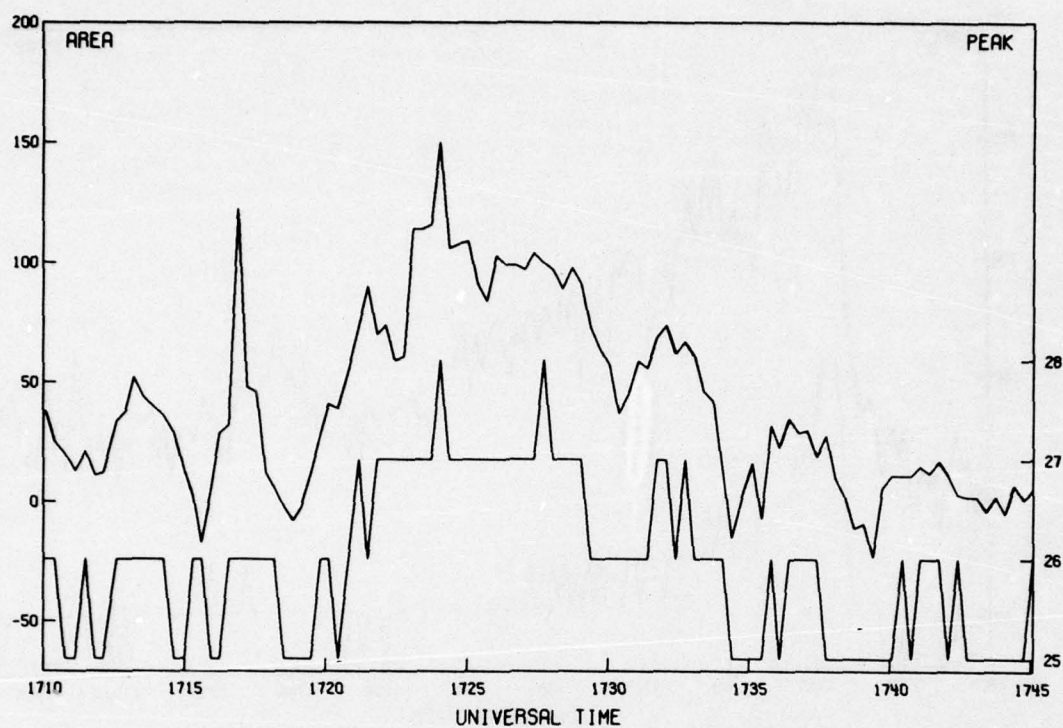


LA POSTA 04 SEP 73 R219 -F FLARE BIN 20

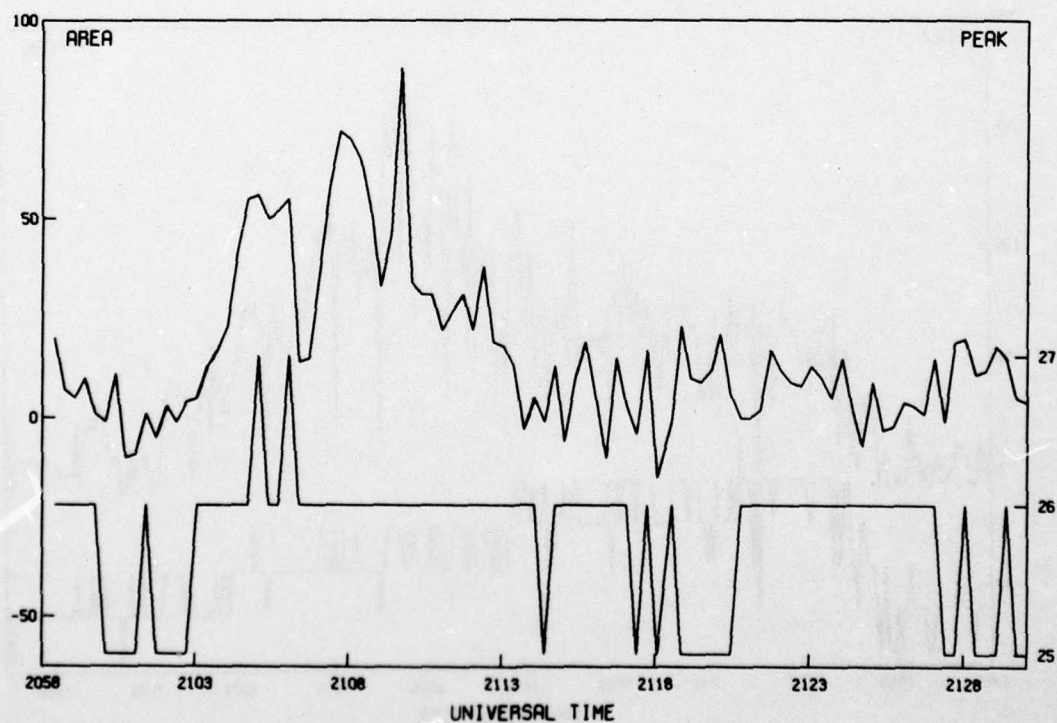


LA POSTA 06 SEP 73 R215 -B FLARE BIN 26

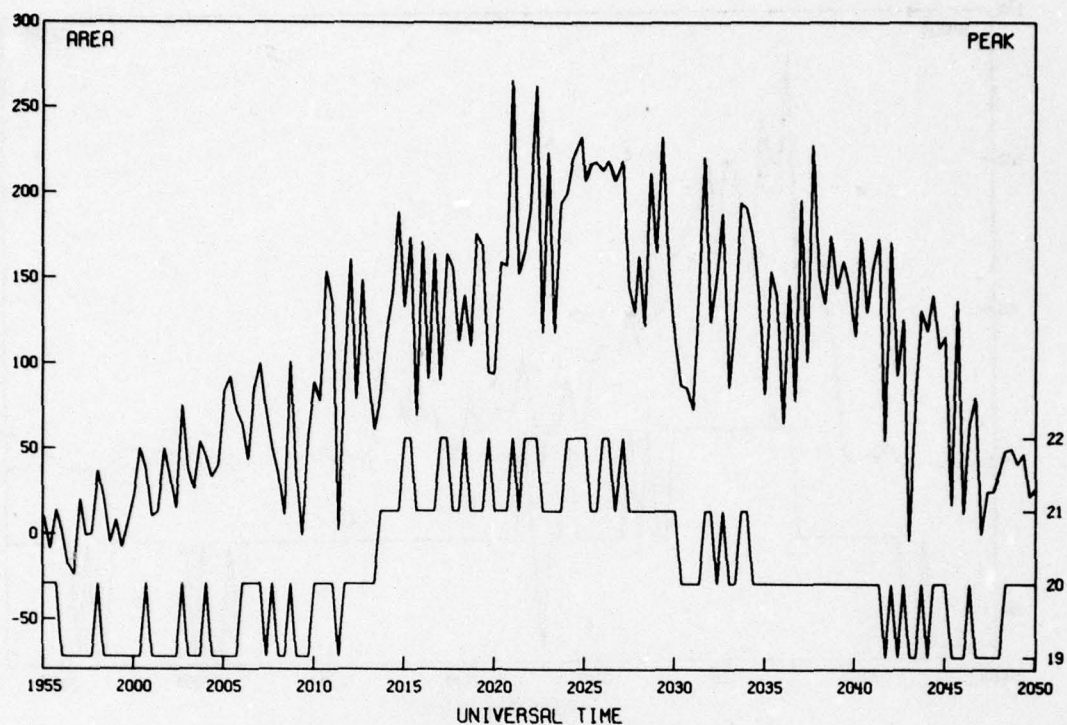




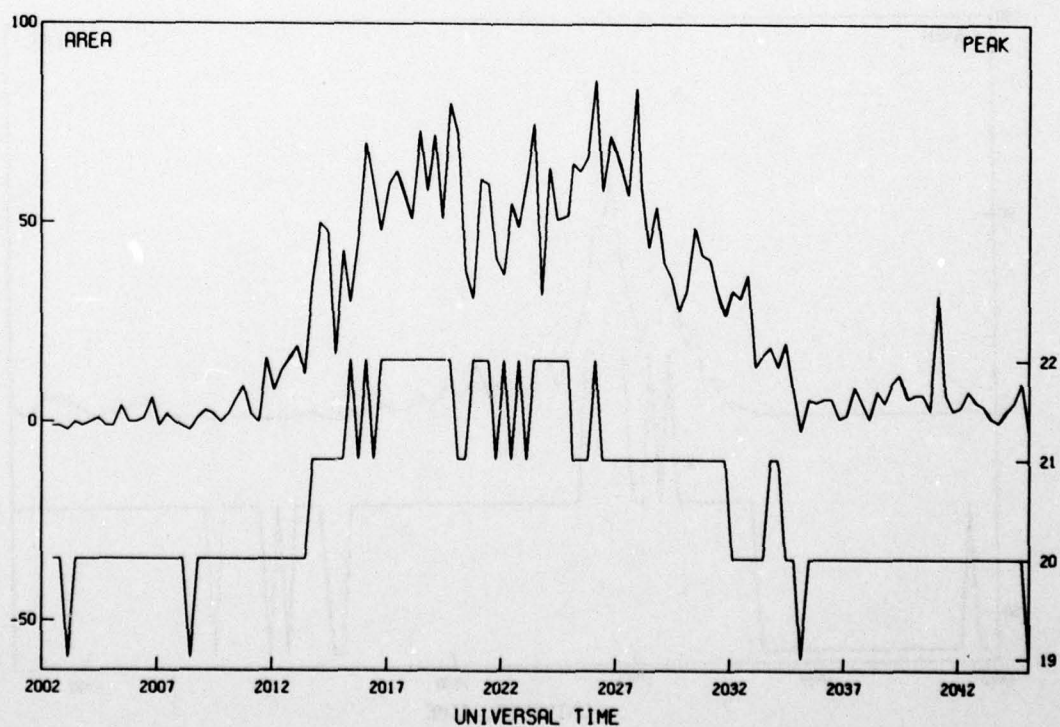
LA POSTA 07 SEP 73 R219 -F FLARE BIN 25



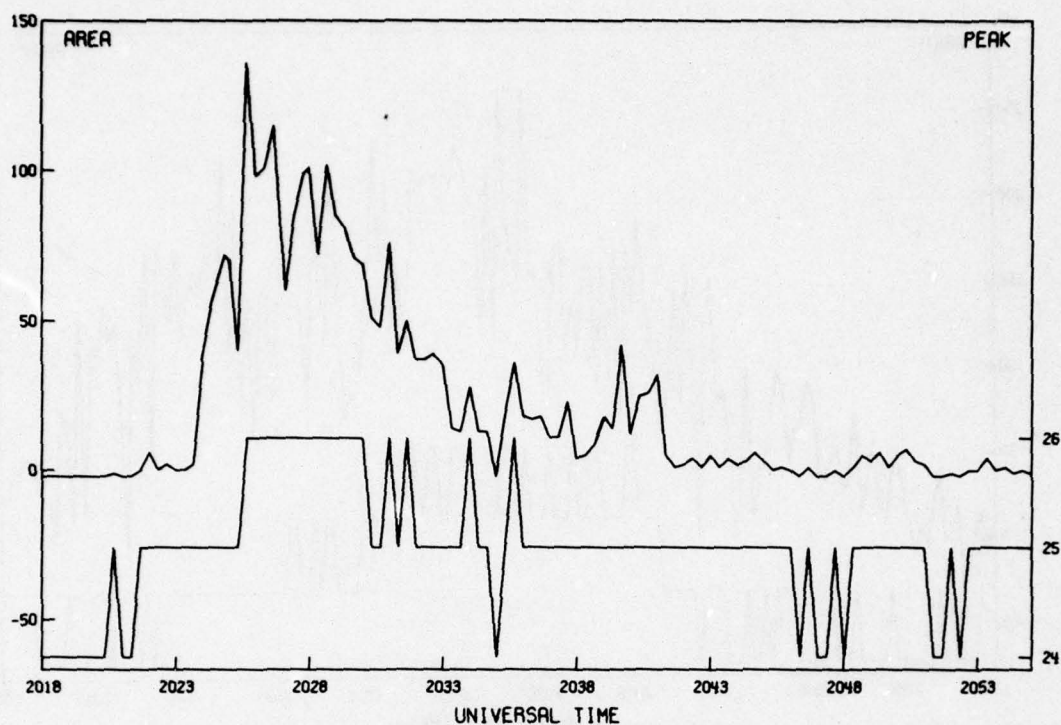
LA POSTA 07 SEP 73 R219 -F FLARE BIN 25



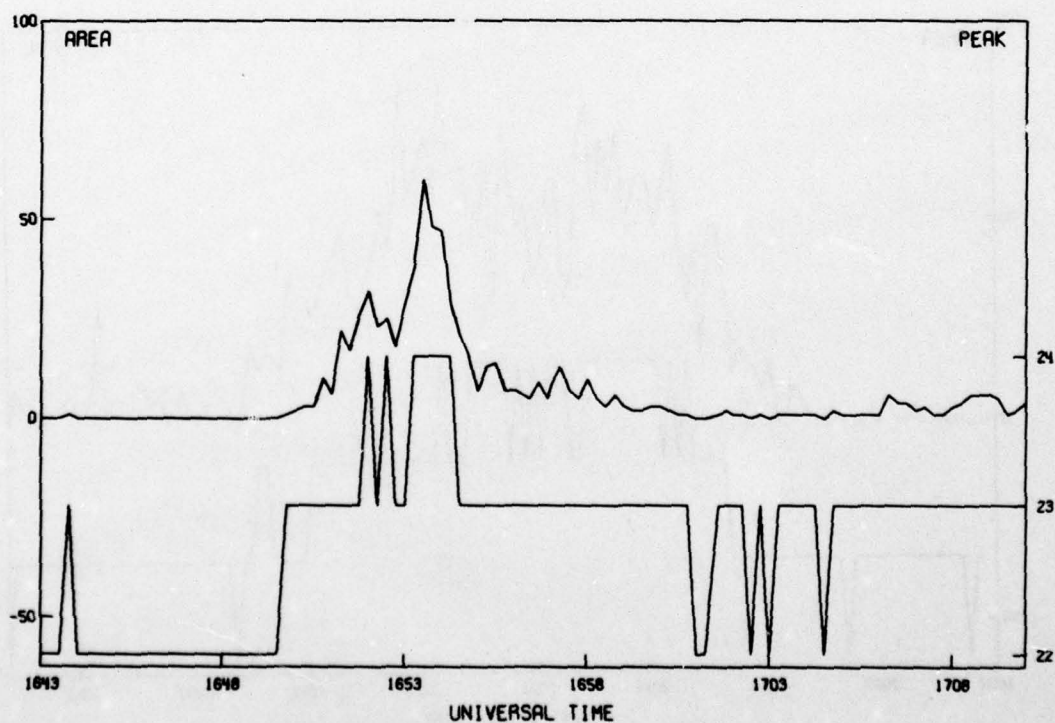
LA POSTA 10 SEP 73 R224 -F FLARE BIN 19



LA POSTA 10 SEP 73 R215 U FLARE BIN 20

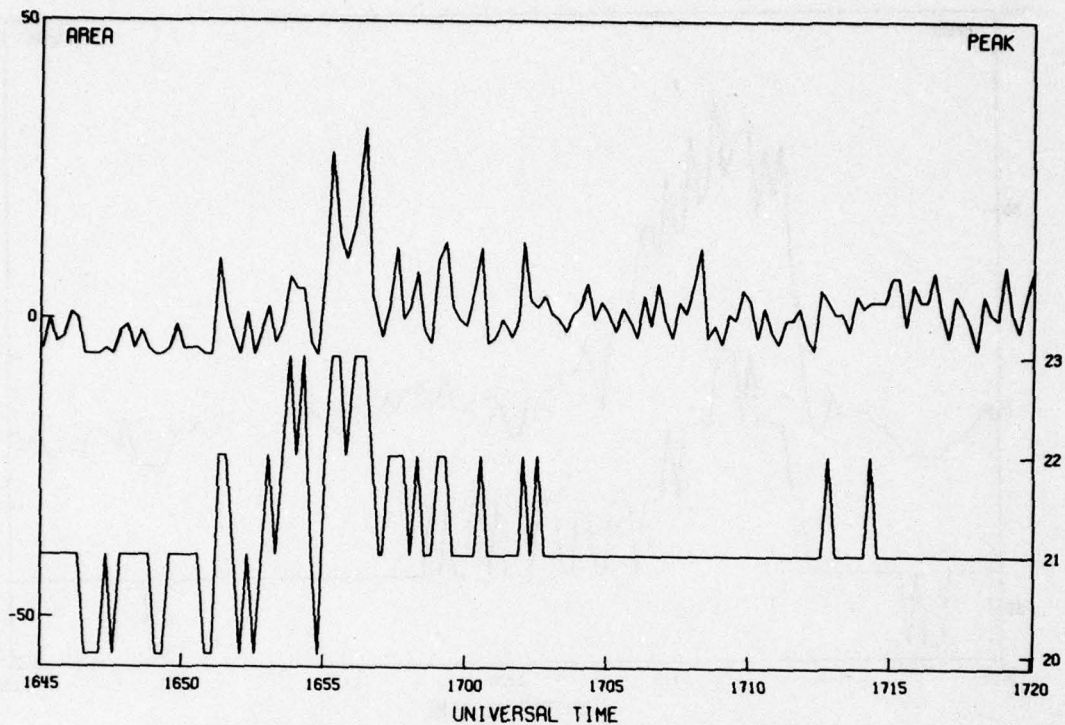


LA POSTA 10 SEP 73 R219 -F FLARE BIN 25

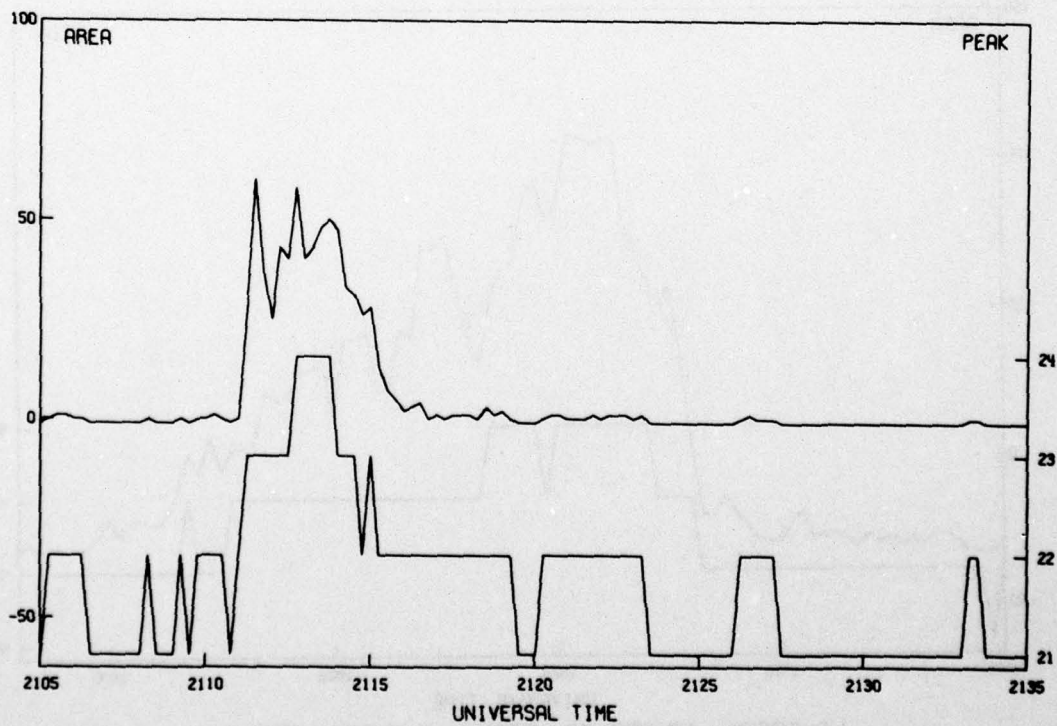


LA POSTA 11 SEP 73 R224 U FLARE BIN 23

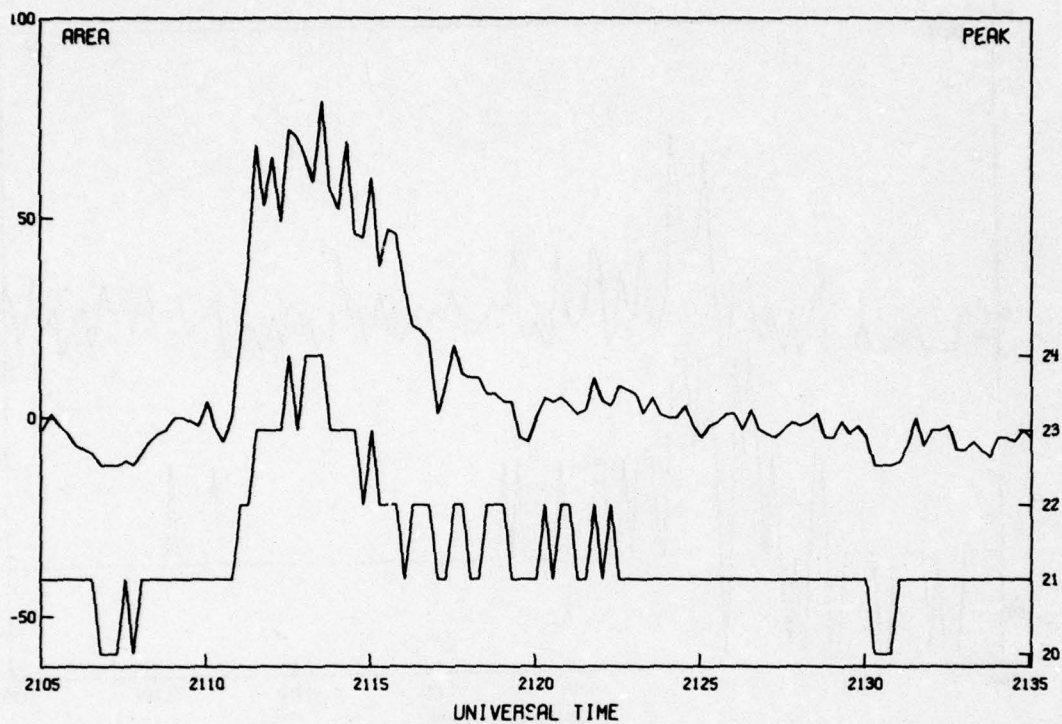




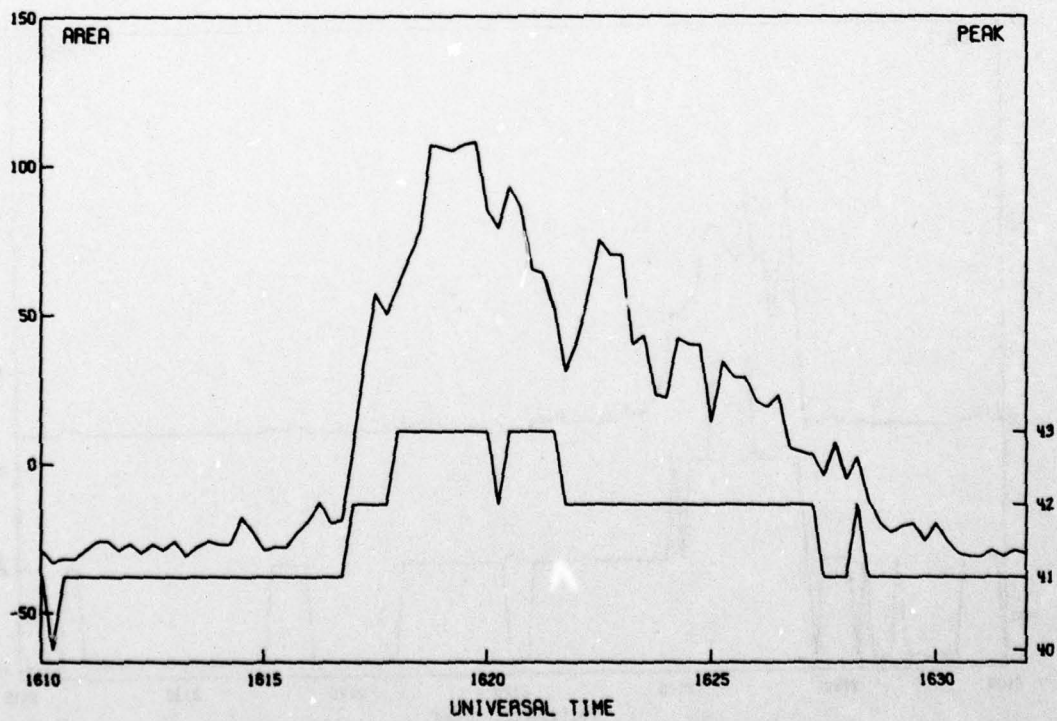
LA POSTA 11 SEP 73 R219 -F FLARE BIN 21



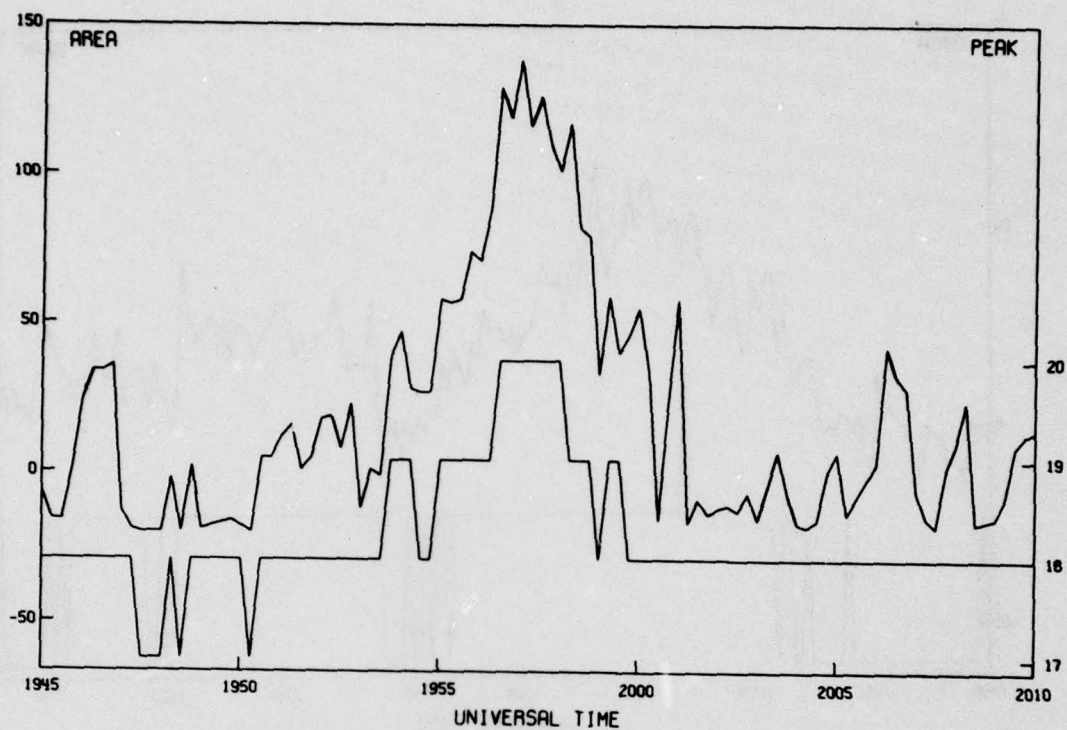
LA POSTA 11 SEP 73 R224 U FLARE BIN 22



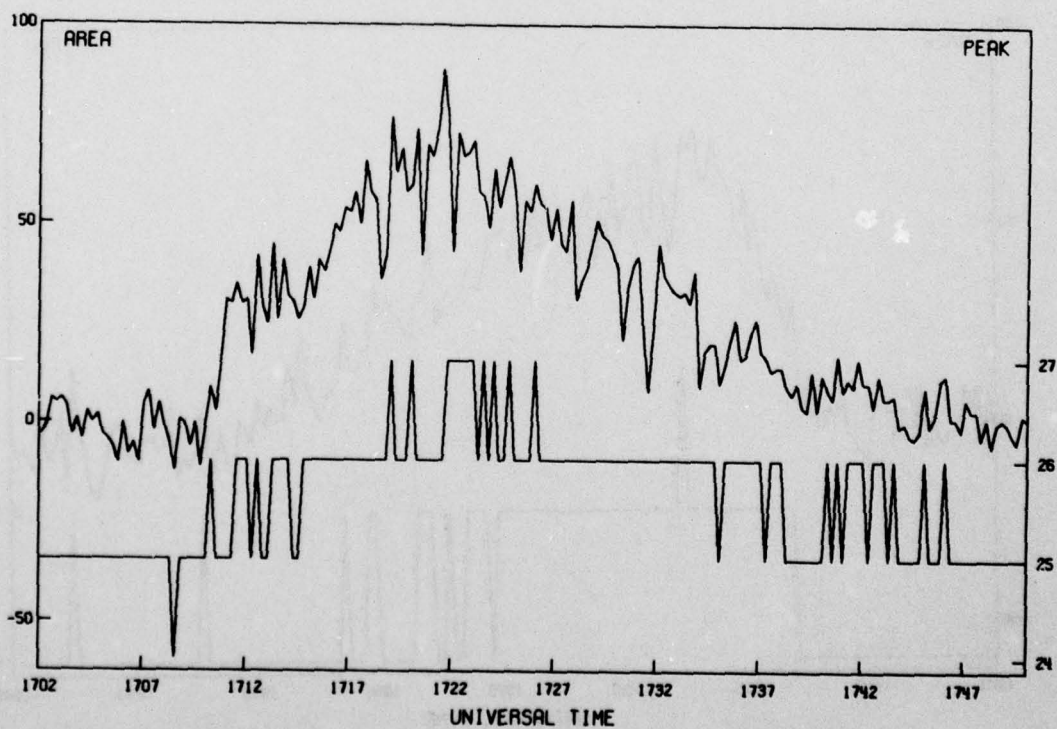
LA POSTA 11 SEP 73 R219 -N FLARE BIN 21



LA POSTA 12 SEP 73 R224 -F FLARE BIN 41

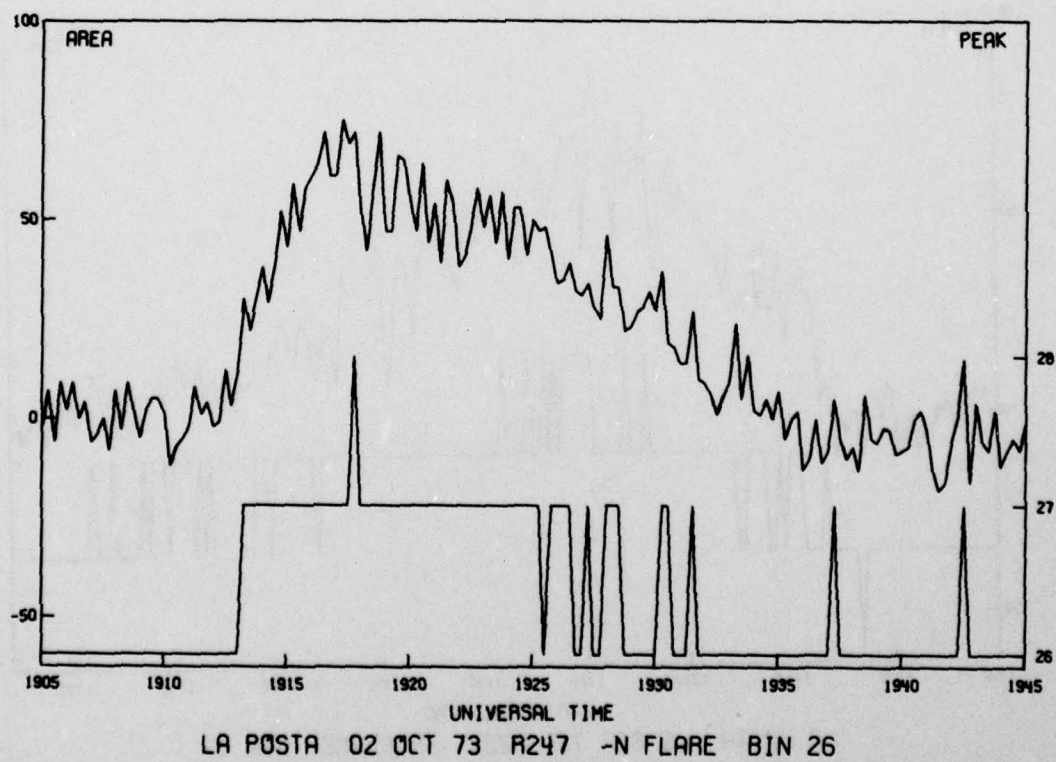
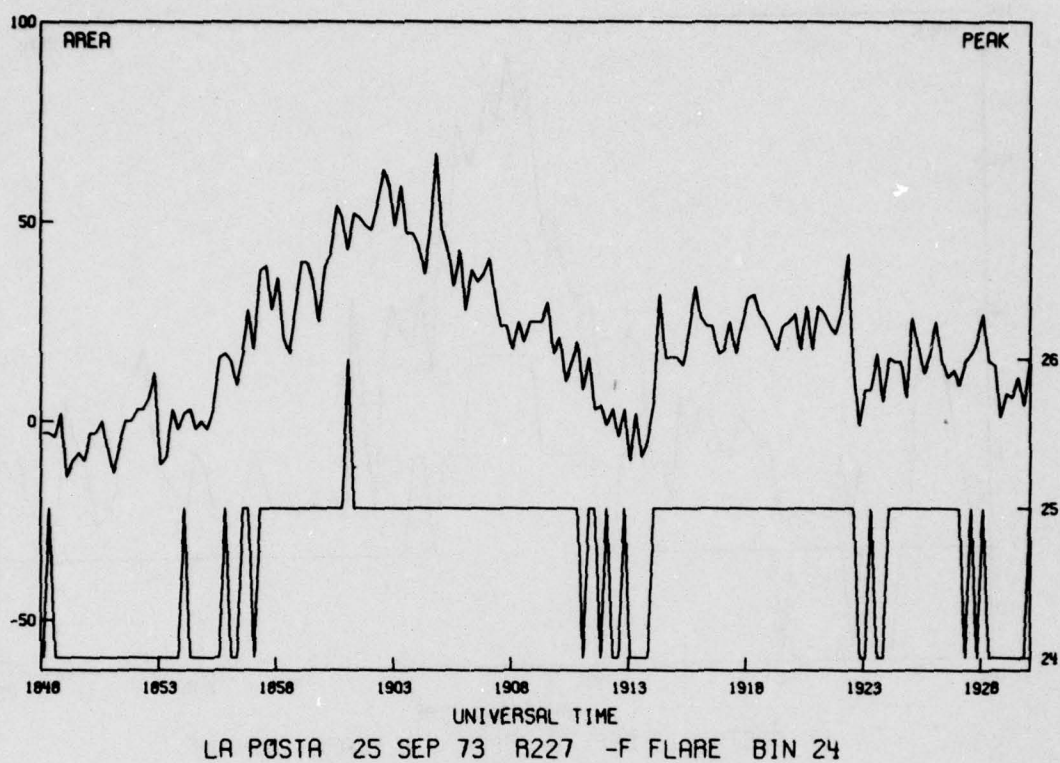


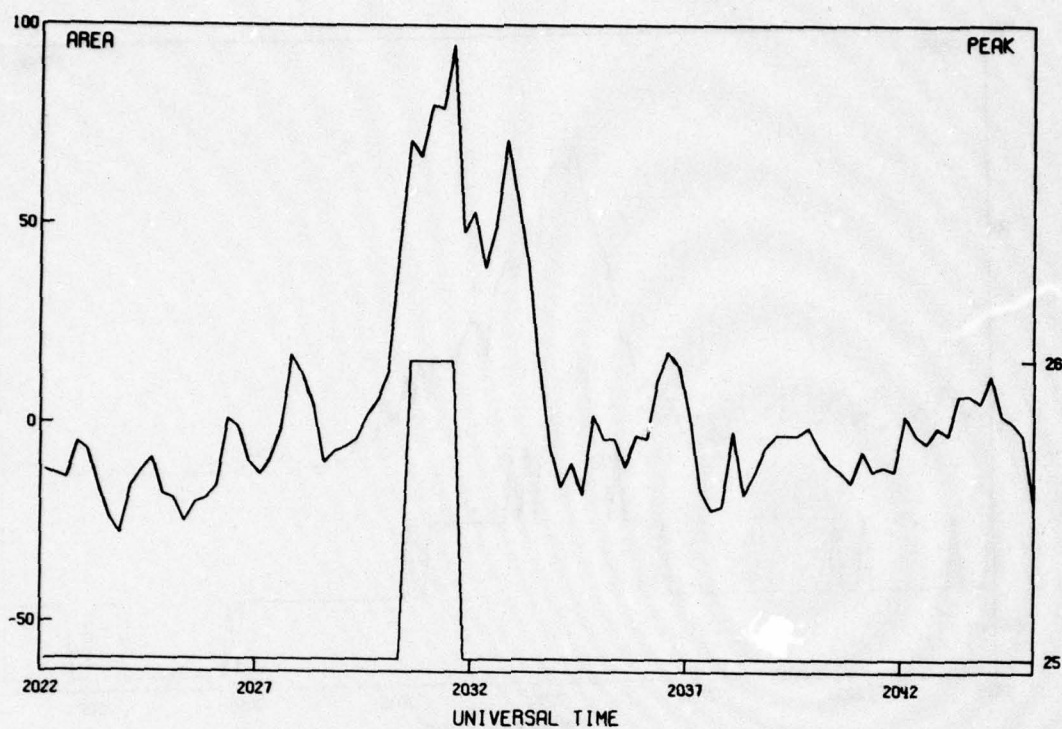
LA POSTA 12 SEP 73 R224 U FLARE BIN 18



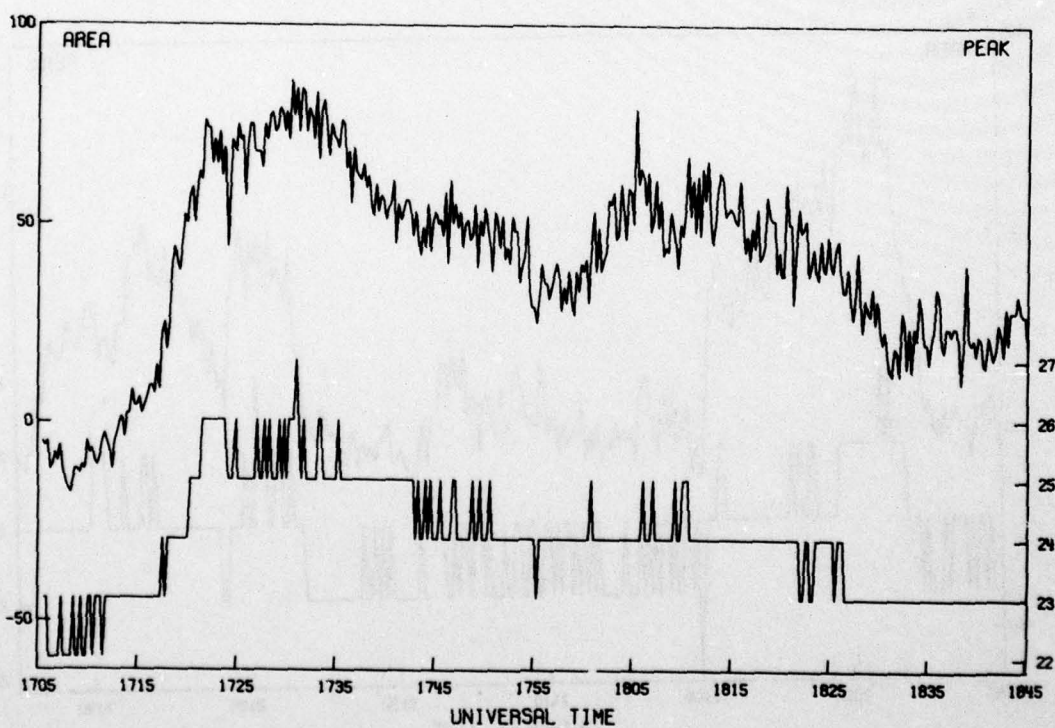
LA POSTA 25 SEP 73 R227 -F FLARE BIN 25



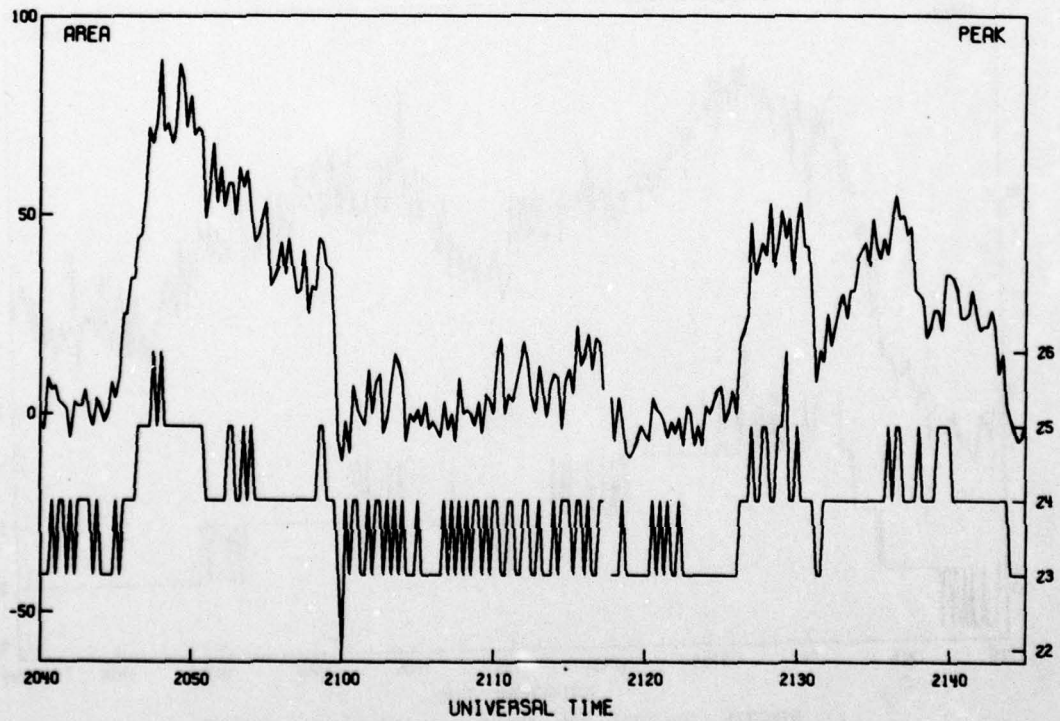
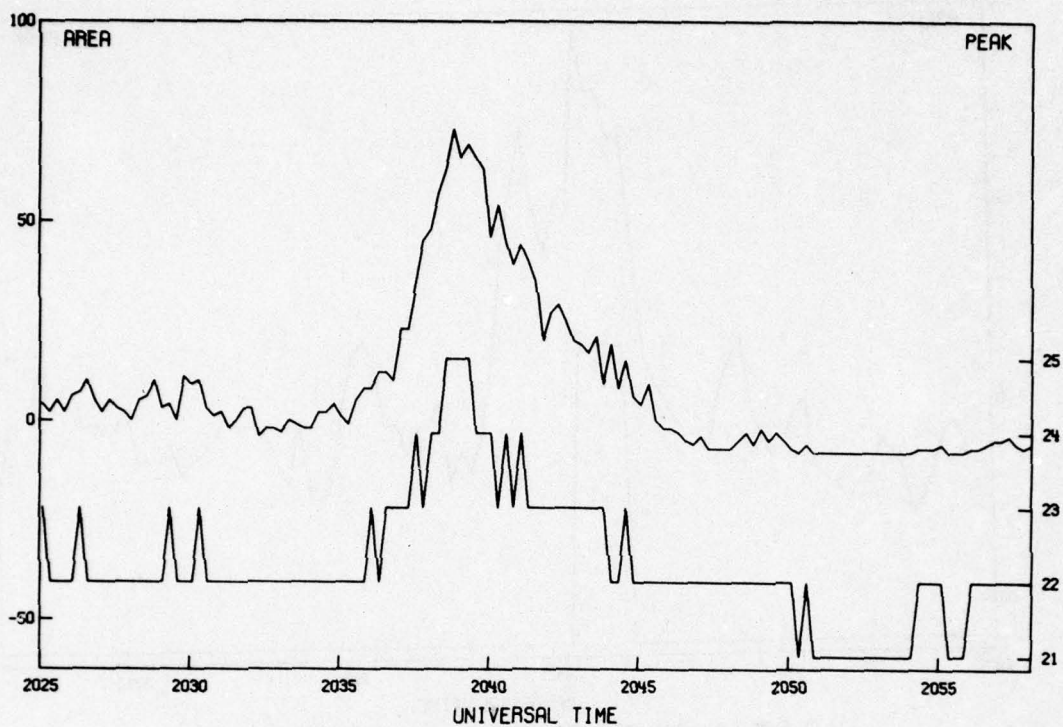




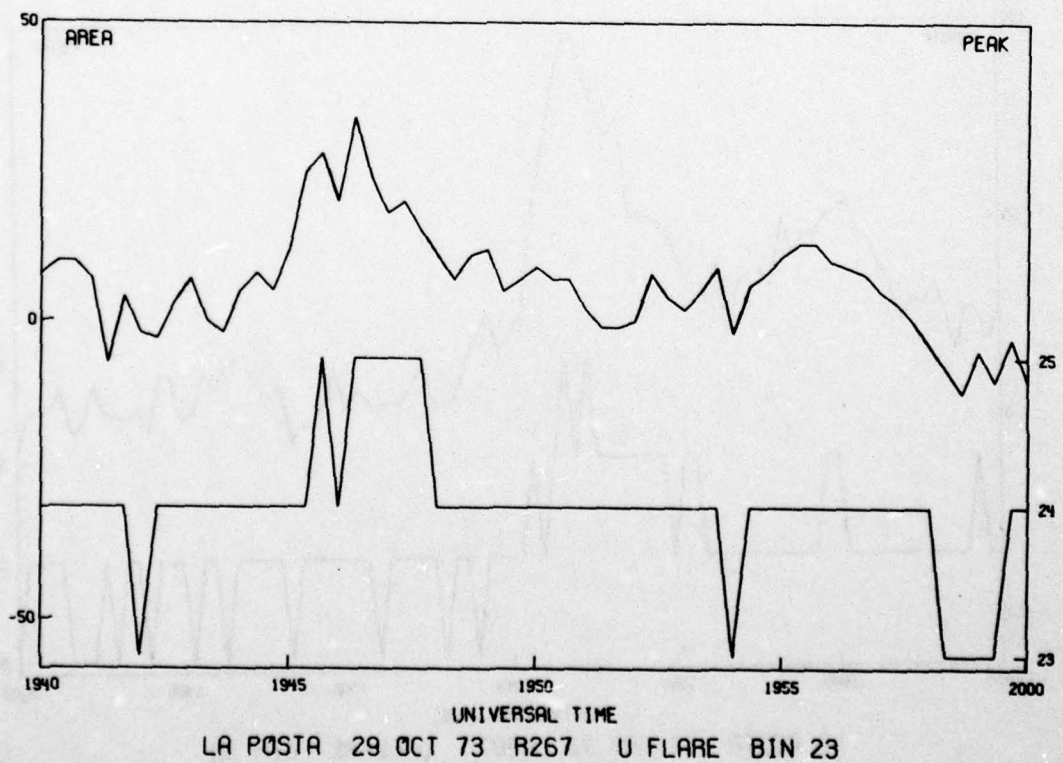
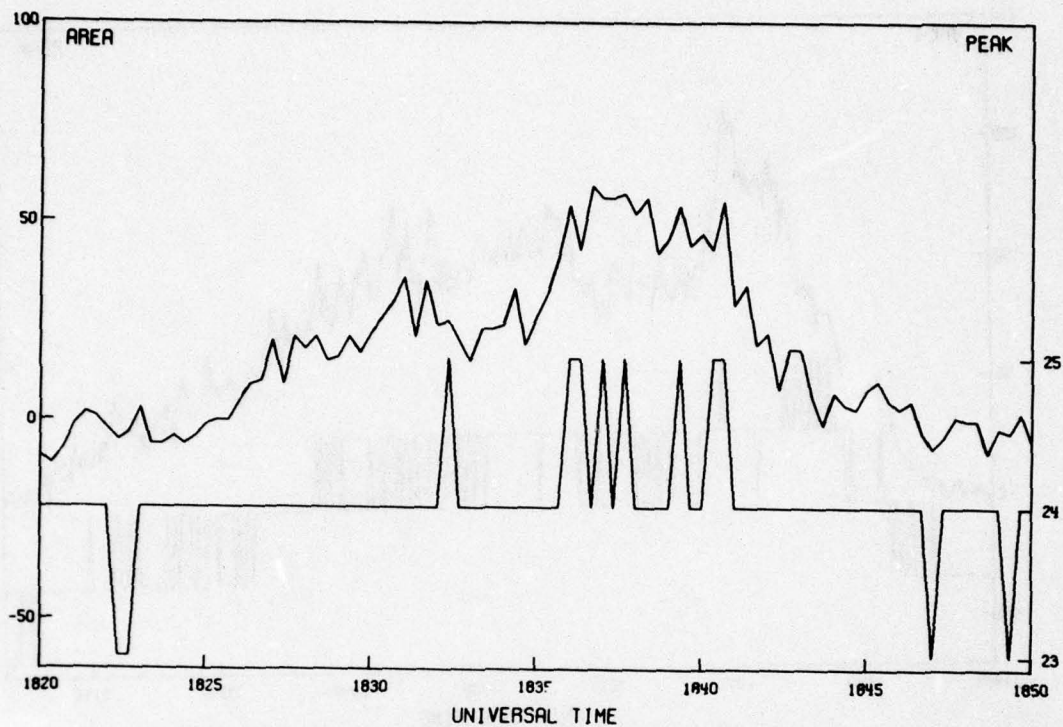
LA POSTA 02 OCT 73 R245 U FLARE BIN 25

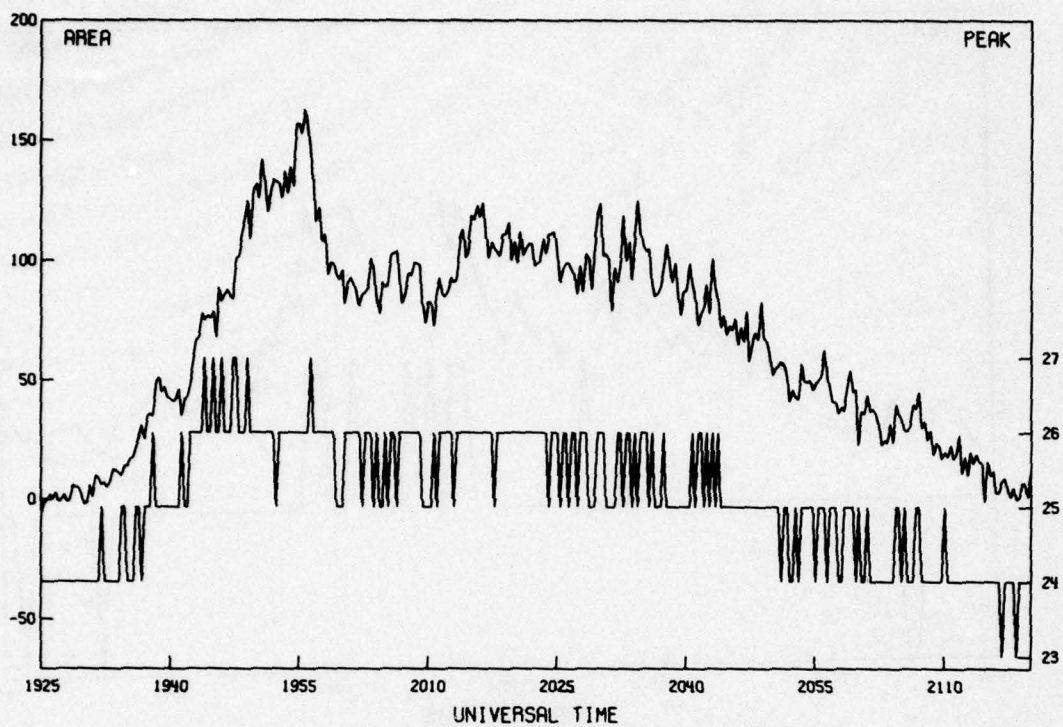


LA POSTA 25 OCT 73 R262 -N FLARE BIN 22

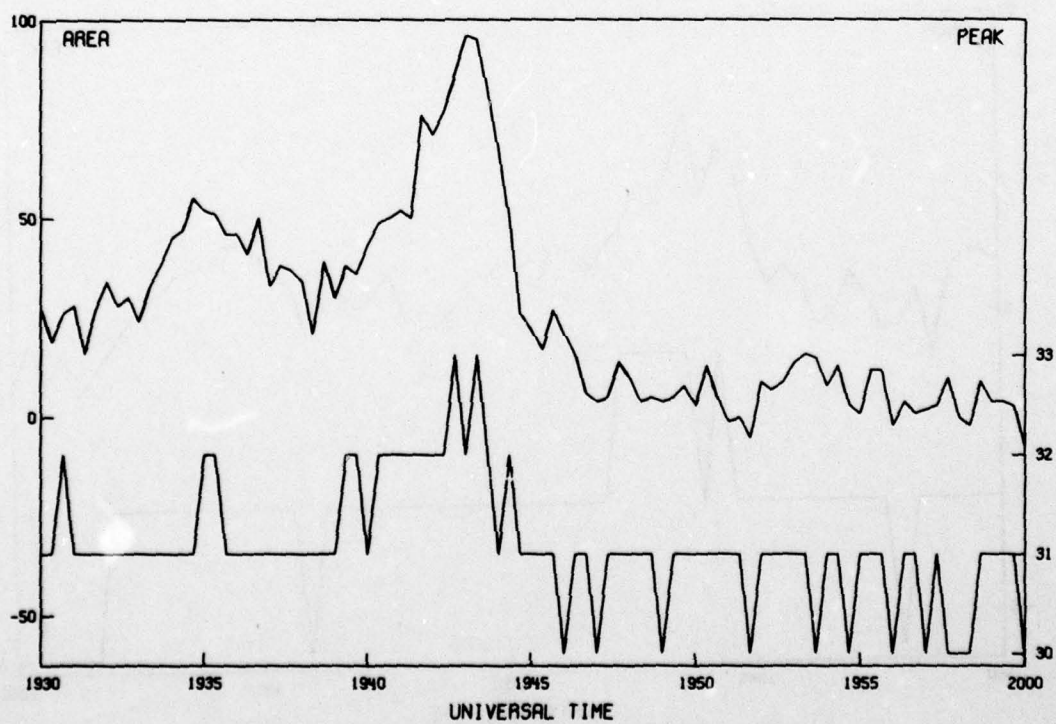




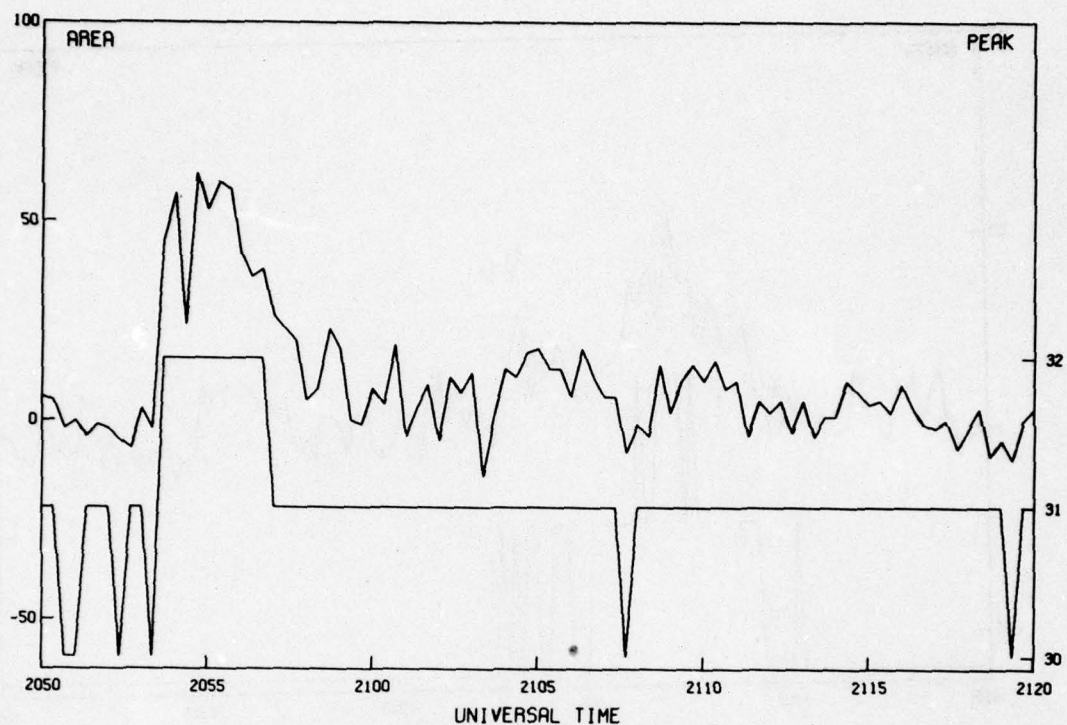




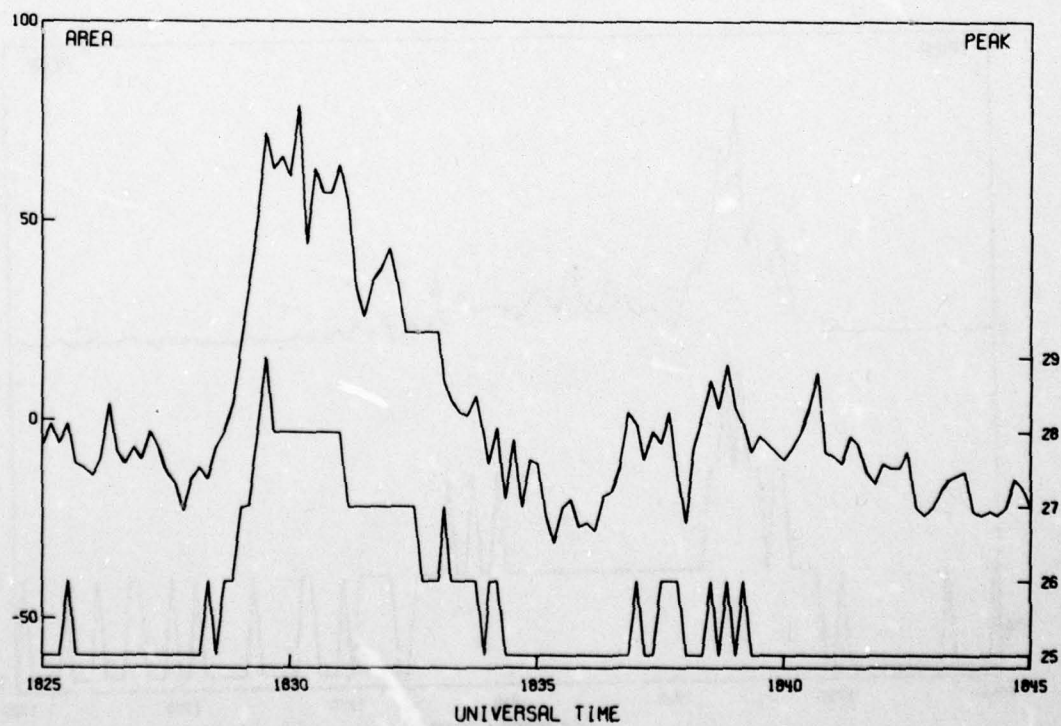
LA POSTA 31 OCT 73 R267 U FLARE BIN 23



LA POSTA 27 NOV 73 R287 U FLARE BIN 30

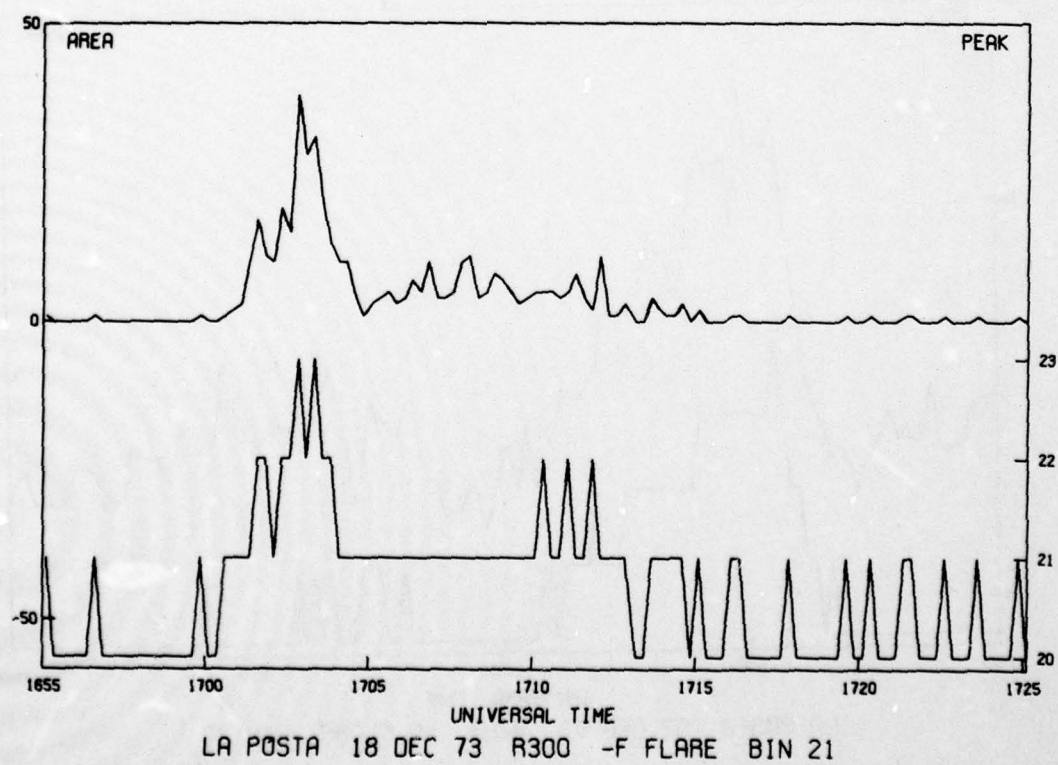
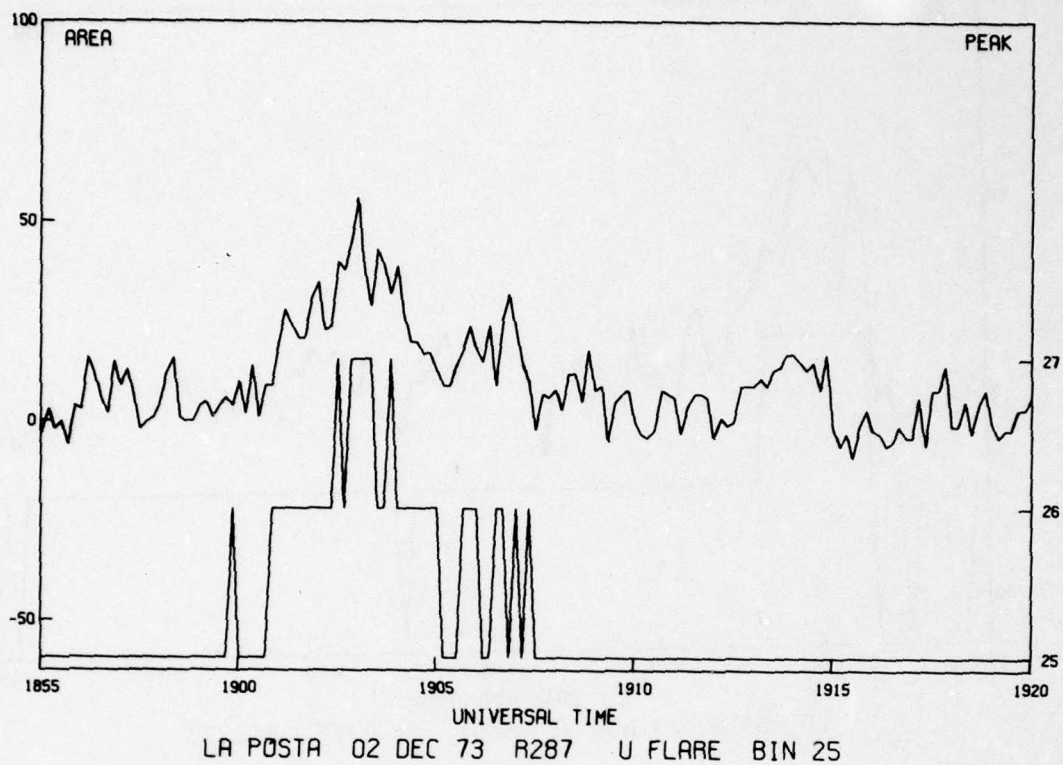


LA POSTA 27 NOV 73 R287 U FLARE BIN 30



LA POSTA 02 DEC 73 R287 -F FLARE BIN 25





AD-A053 121

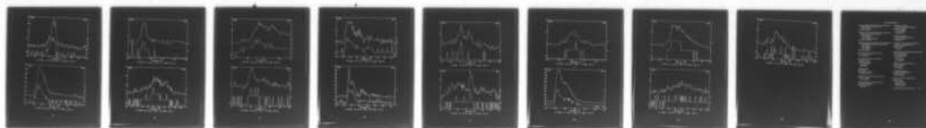
NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA  
SOLAR H-ALPHA FLARE ATLAS BASED ON NOSC VIDEOMETER DATA. (U)  
JAN 78 P E ARGO, W LOOMIS  
NOSC/TD-140

F/G 3/2

UNCLASSIFIED

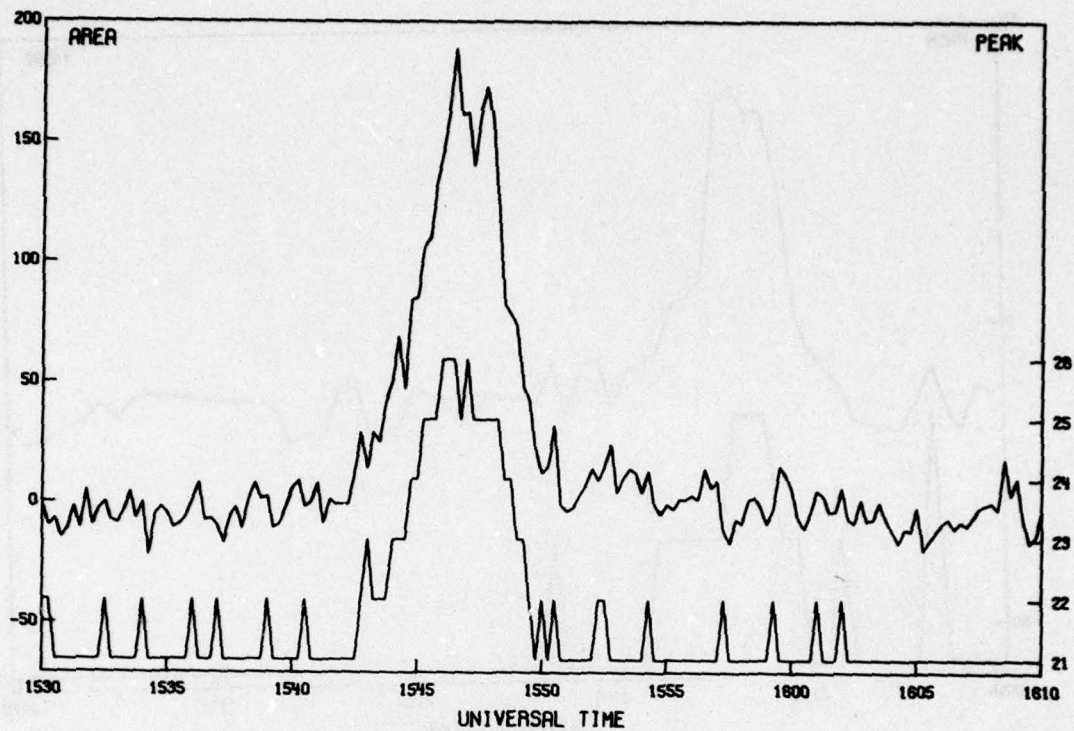
NL

2 OF 2  
ADA  
053121

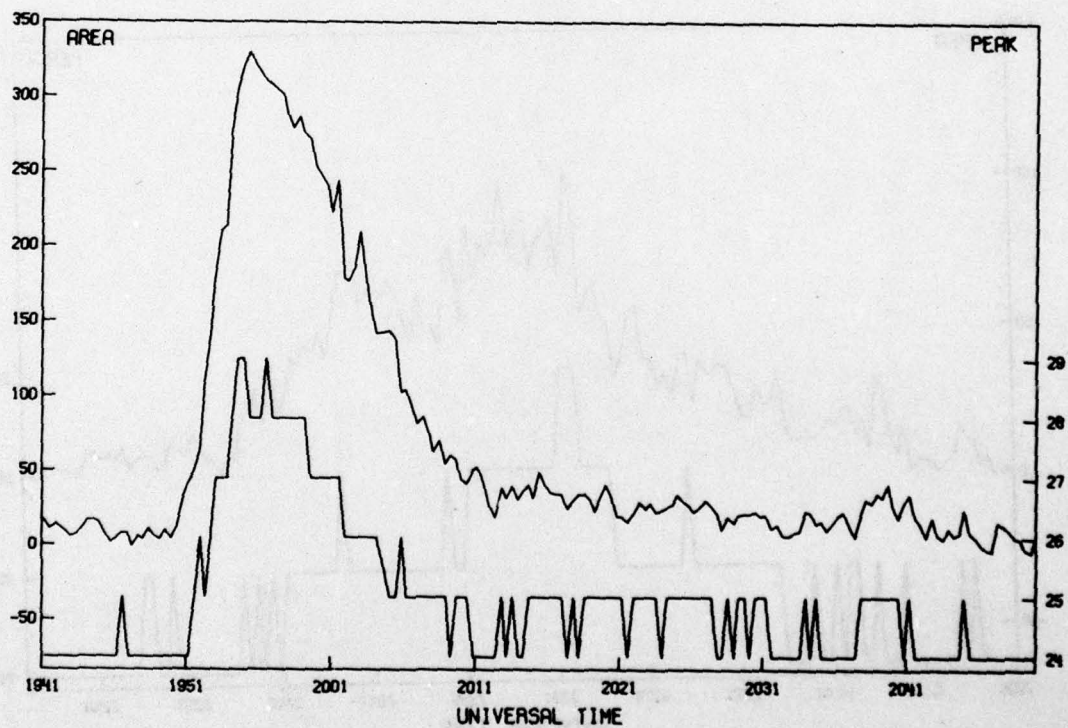


END  
DATE  
FILMED

6-78  
DOC

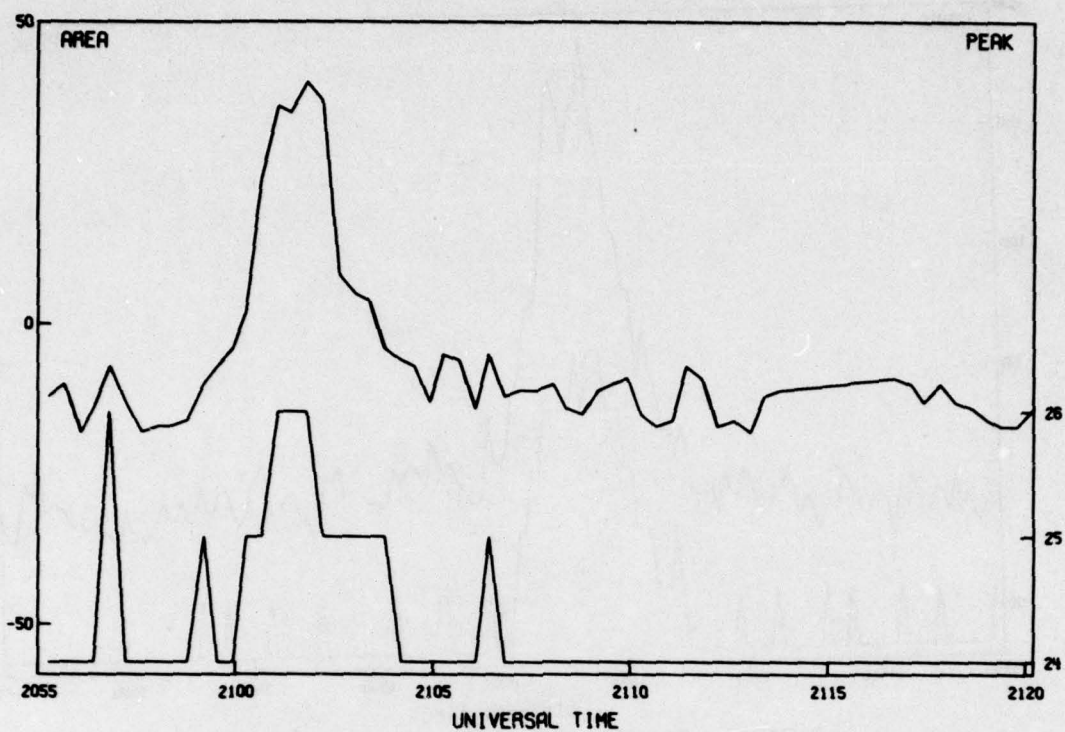


LA POSTA 01 JUN 74 R416 -N FLARE BIN 21

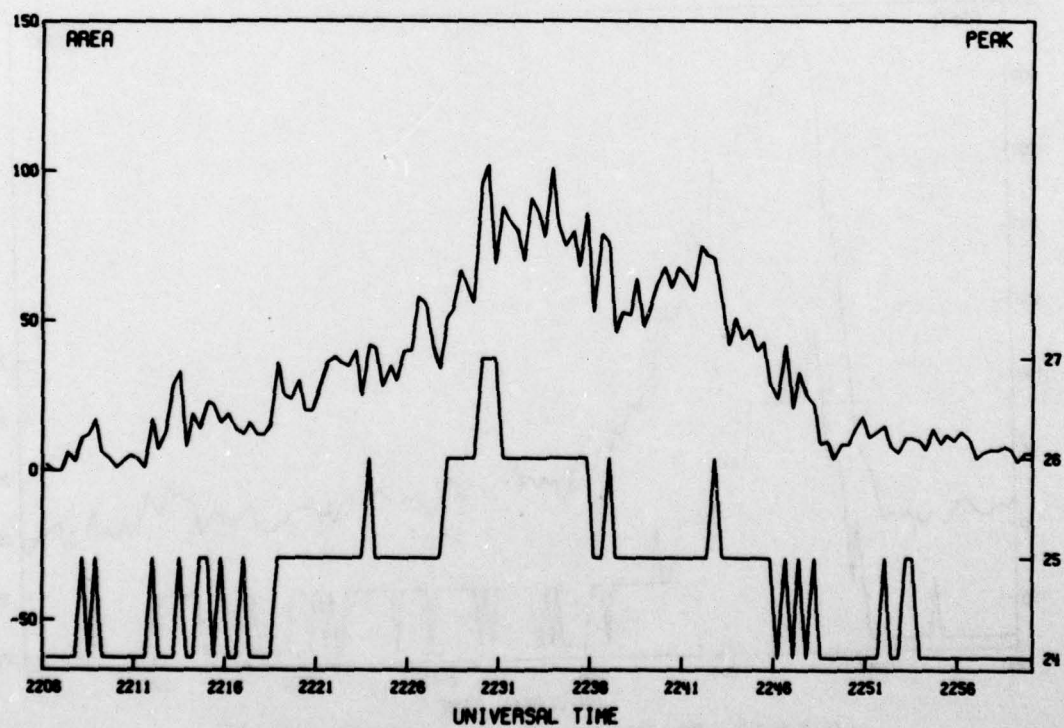


LA POSTA 03 JUN 74 R416 -N FLARE BIN 24

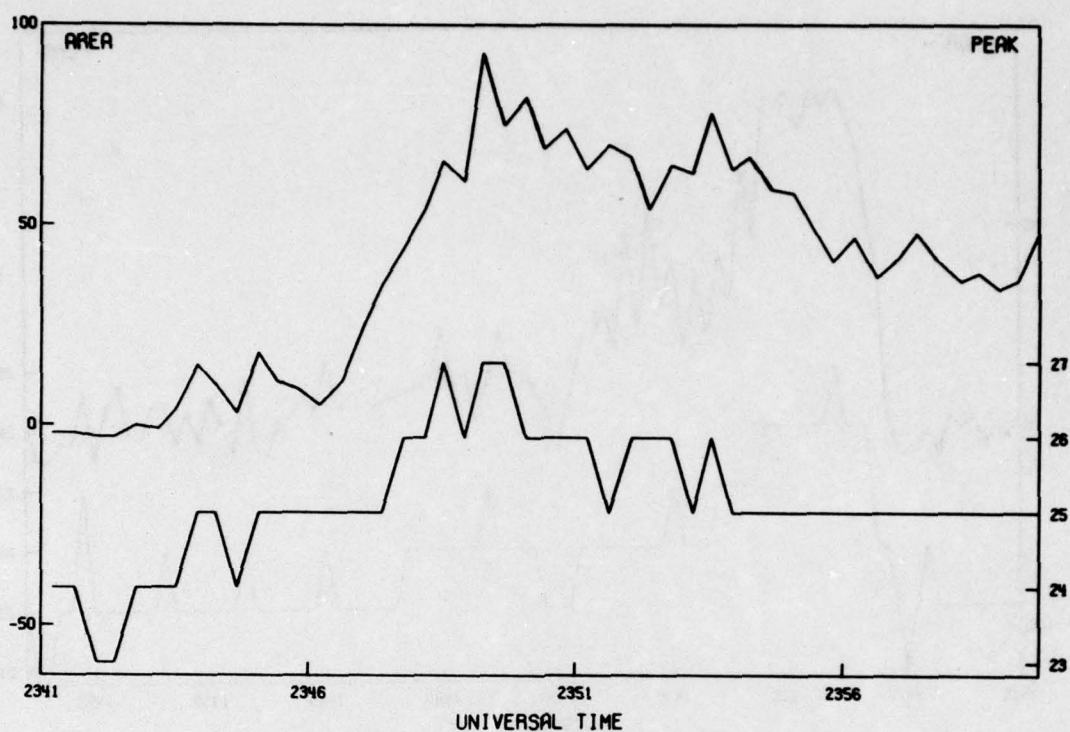




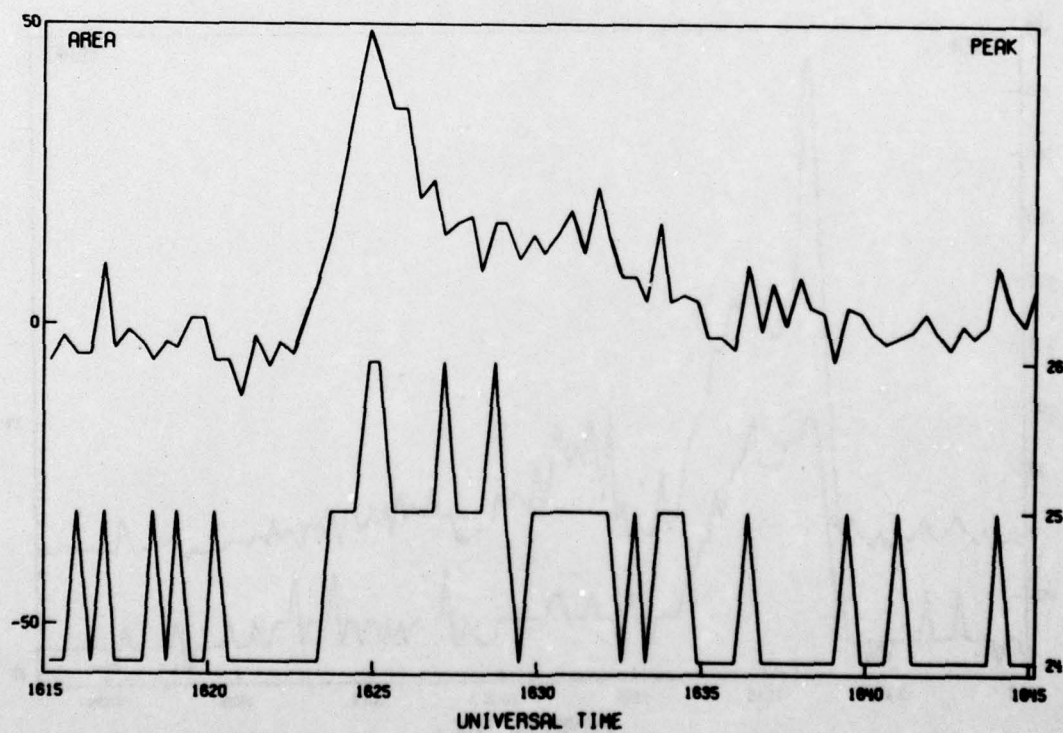
LA POSTA 03 JUN 74 R414 -F FLARE BIN 24



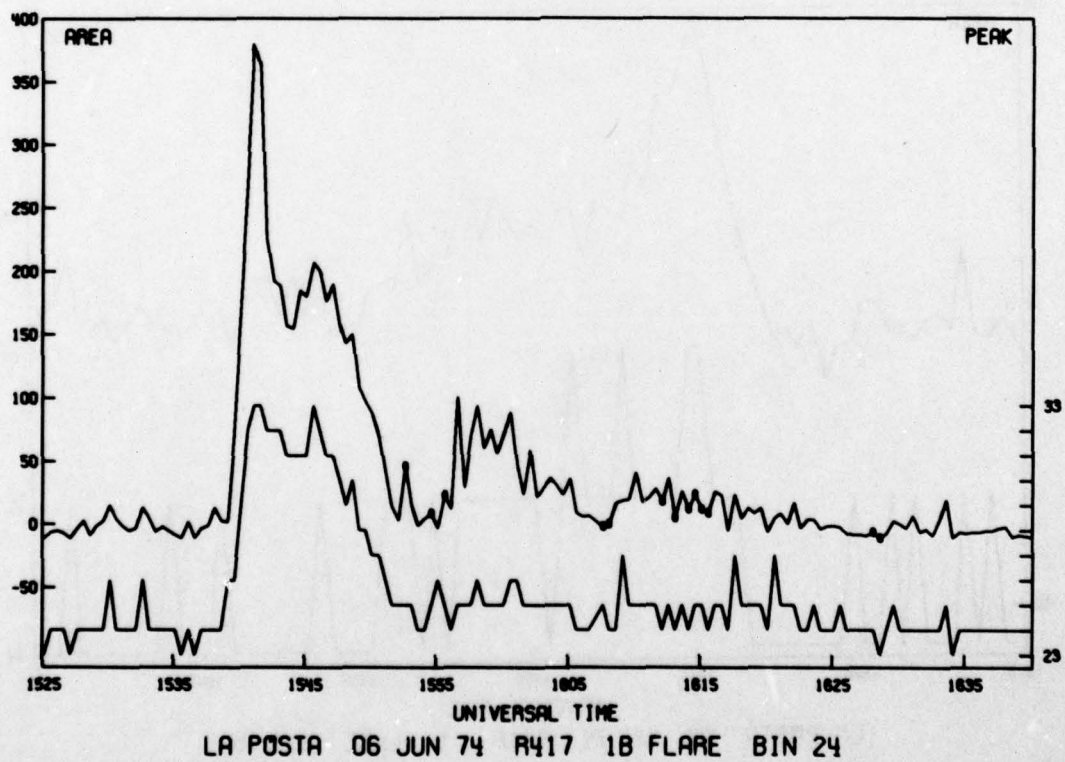
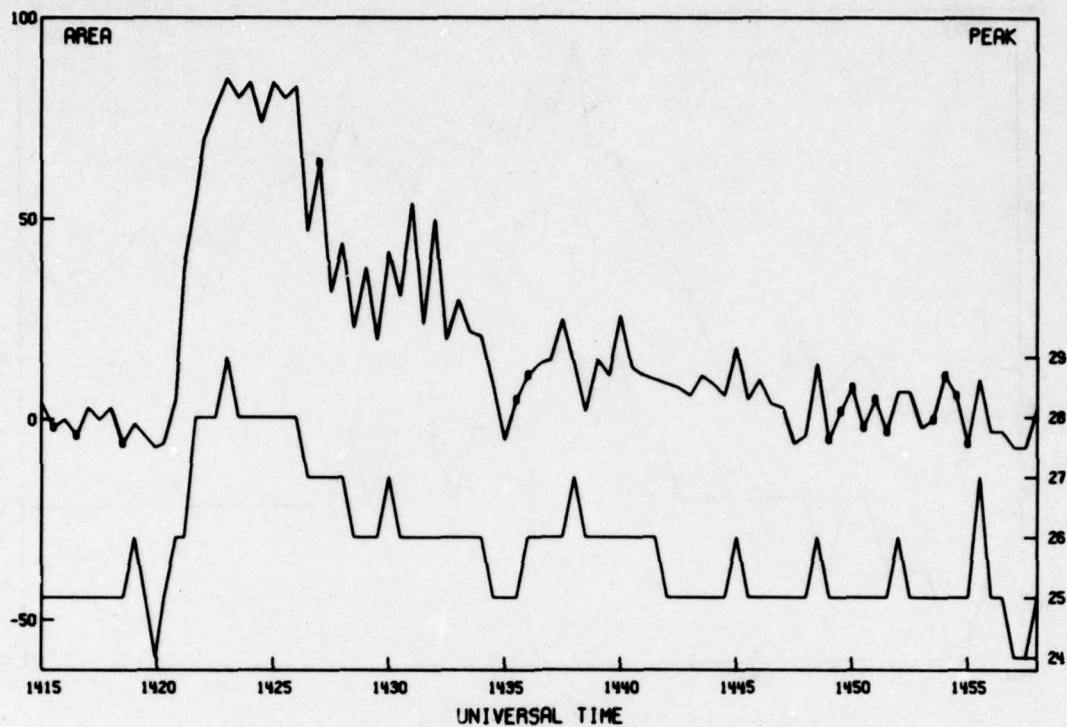
LA POSTA 03 JUN 74 R414 -B FLARE BIN 24



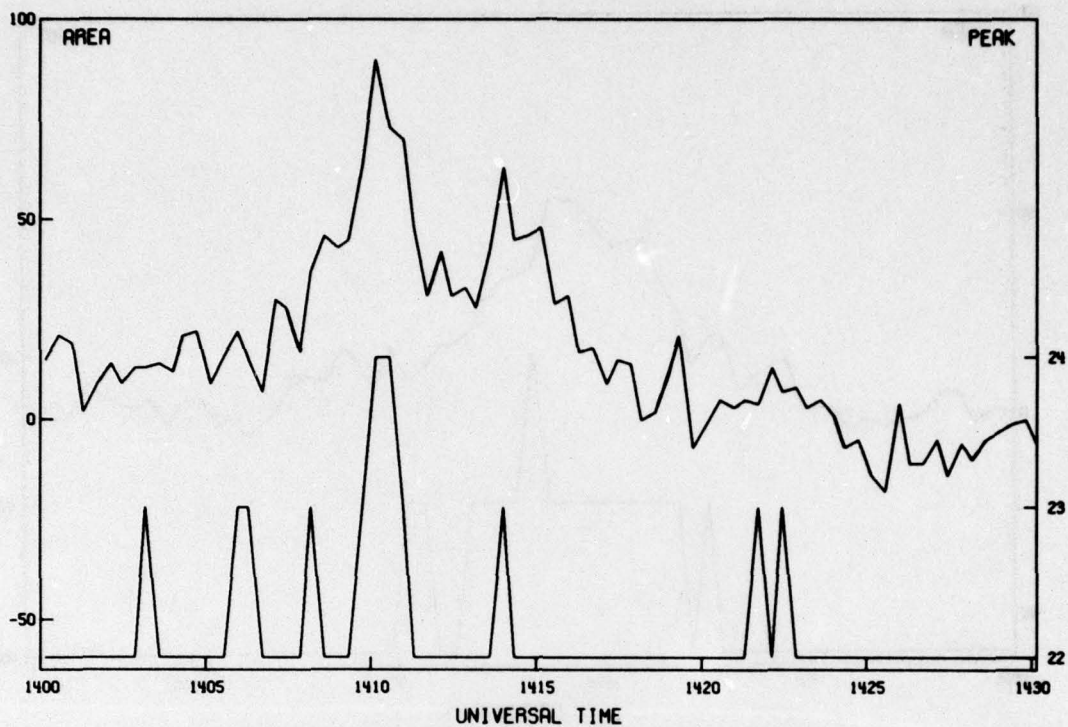
LA POSTA 03 JUN 74 R414 -N FLARE BIN 24



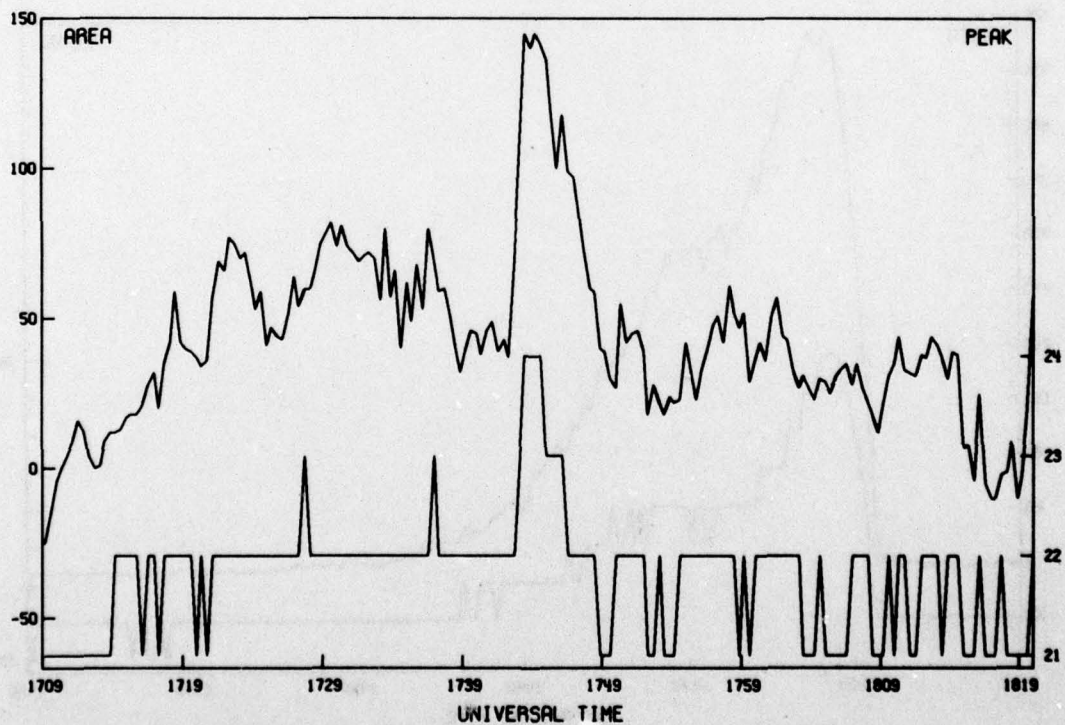
LA POSTA 04 JUN 74 R416 U FLARE BIN 24



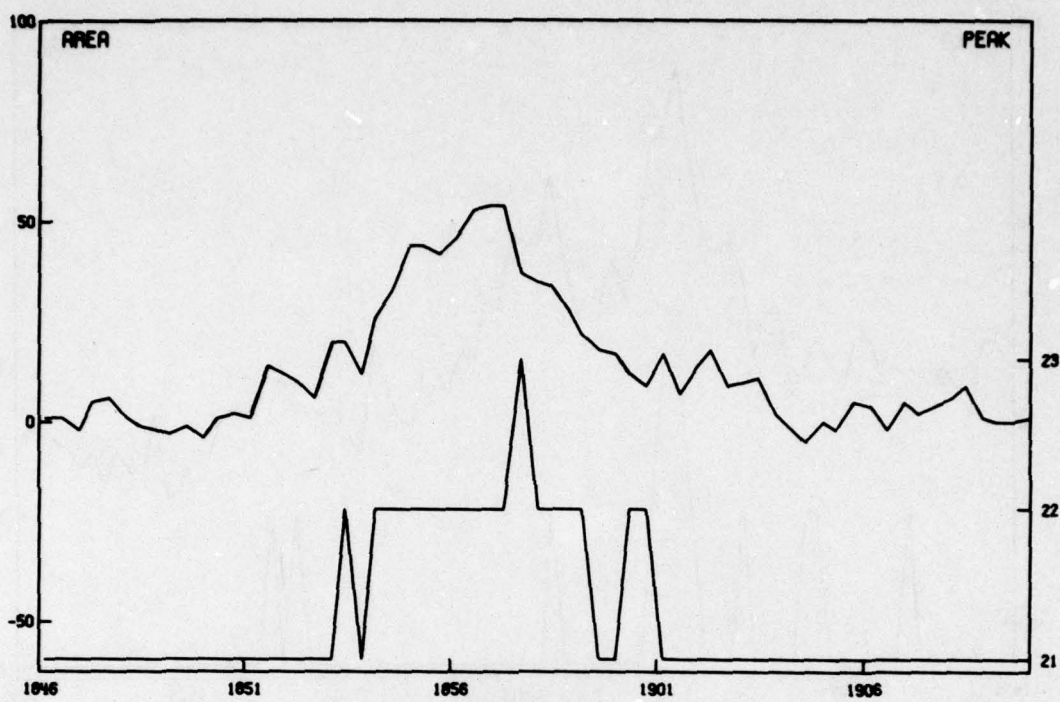




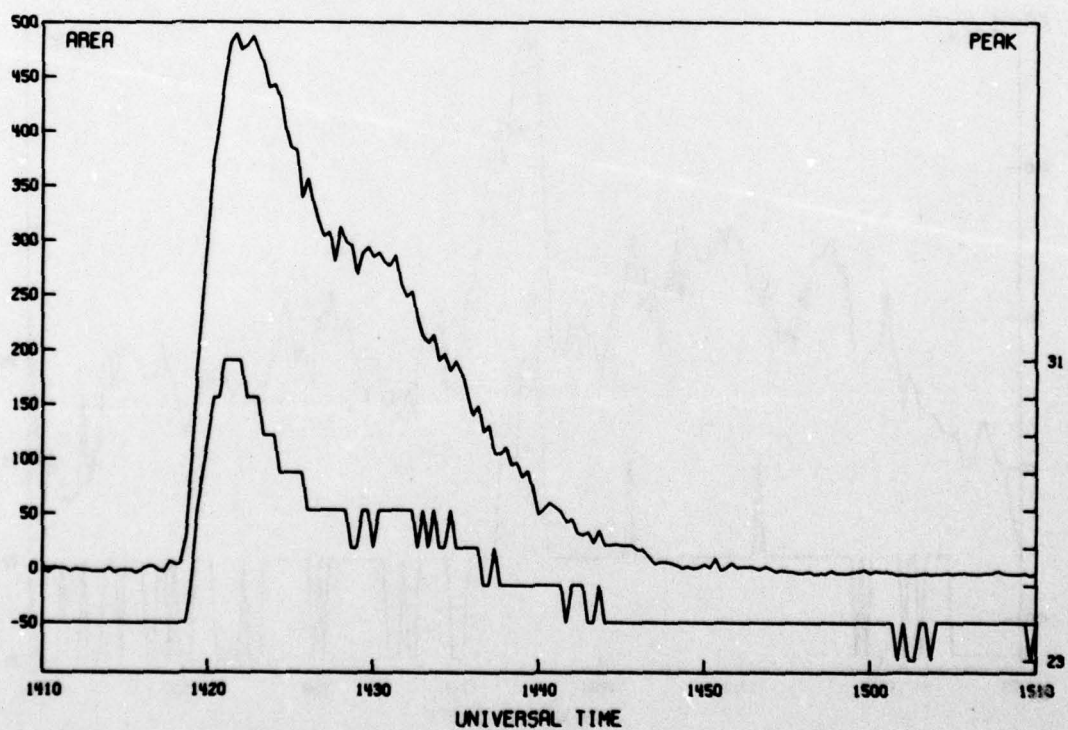
LA POSTA 10 JUN 74 R426 -N FLARE BIN 21



LA POSTA 10 JUN 74 R426 -F FLARE BIN 21

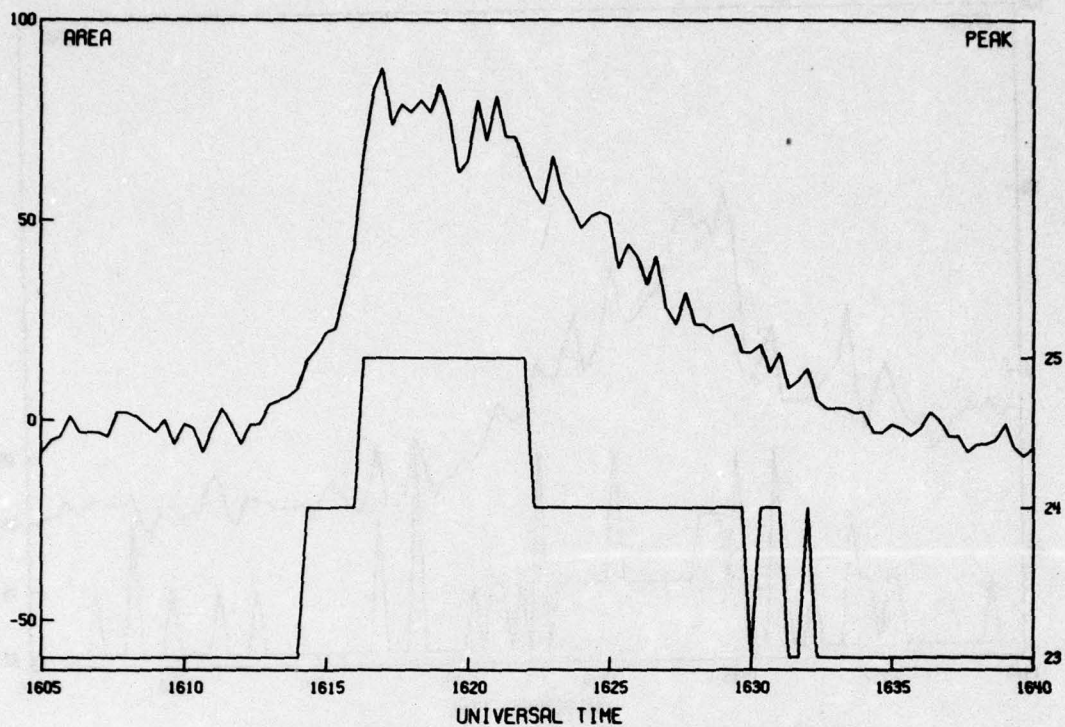


LA POSTA 10 JUN 74 R426 U FLARE BIN 21

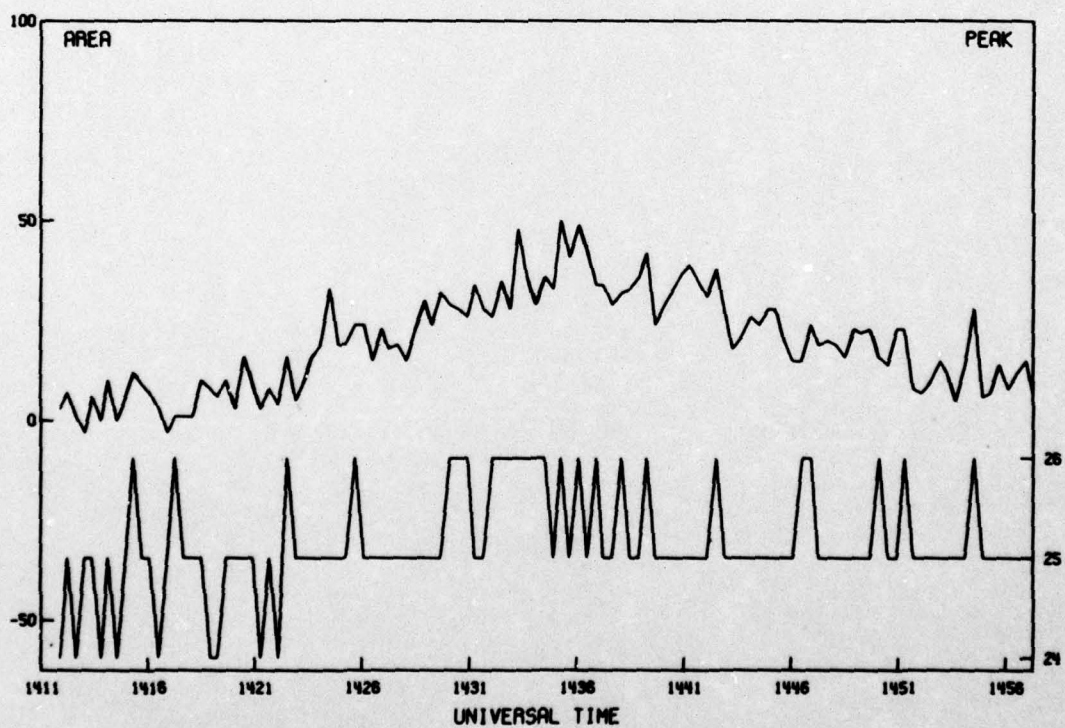


LA POSTA 14 JUN 74 R426 1B FLARE BIN 24



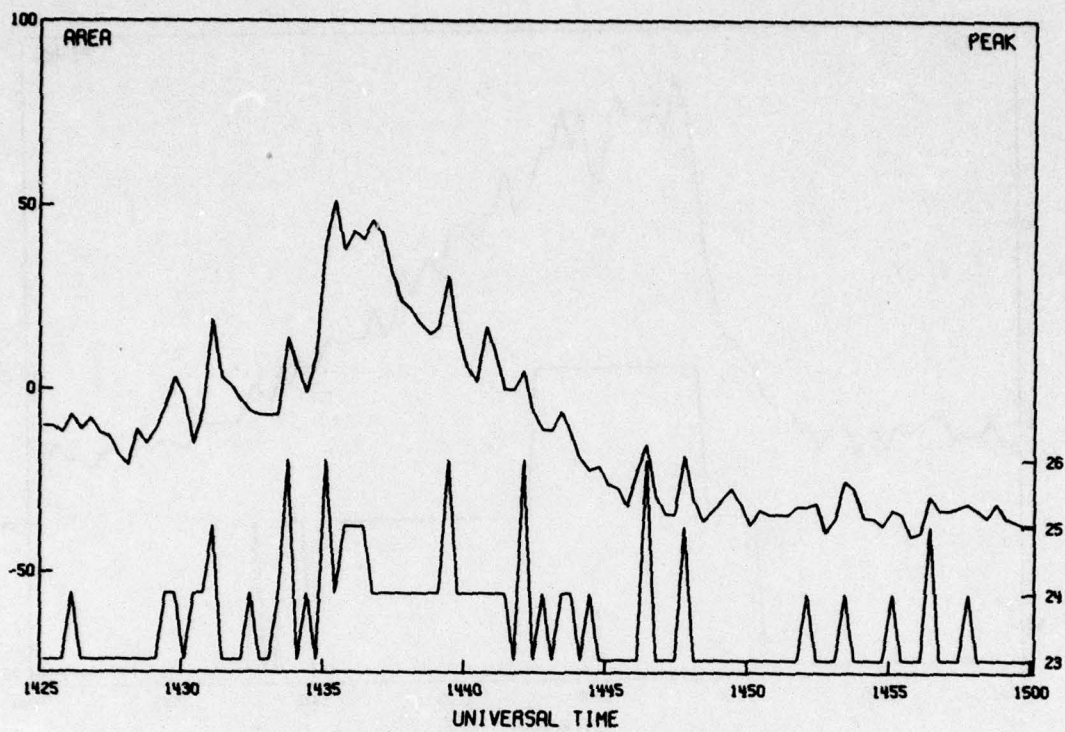


LA POSTA 14 JUN 74 R426 -N FLARE BIN 23



LA POSTA 19 JUN 74 R428 U FLARE BIN 24





LA POSTA 21 JUN 74 R428 1N FLARE BIN 23

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